

# **Revolving Unit with ERS 560V Rotary Module RVK 100**

## **Assembly and Operating Manual**



## Imprint

### Copyright:

This manual remains the copyrighted property of SCHUNK GmbH & Co. KG. It is solely supplied to our customers and operators of our products and forms part of the product. This documentation may not be duplicated or made accessible to third parties, in particular competitive companies, without our prior permission.

### Technical changes:

We reserve the right to make alterations for the purpose of technical improvement.

**Document number:** 0389696

**Edition:** 01.01 | 14/09/2015 | en

© SCHUNK GmbH & Co. KG

All rights reserved.

Dear customer,

congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase.

Kindest Regards

Yours SCHUNK GmbH & Co. KG

Spann- und Greiftechnik

Bahnhofstr. 106 – 134

D-74348 Lauffen/Neckar

Tel. +49-7133-103-0

Fax +49-7133-103-2399

info@de.schunk.com

www.schunk.com



Reg. No. 003496 QM08



Reg. No. 003496 QM08

## Table of contents

<b>1</b>	<b>About this manual .....</b>	<b>6</b>
1.1	Warnings.....	6
1.2	Applicable documents .....	7
<b>2</b>	<b>Basic safety notes .....</b>	<b>8</b>
2.1	Intended use.....	8
2.2	Not intended use .....	8
2.3	General safety notes .....	8
2.4	Environmental and operating conditions.....	10
2.4.1	Electromagnetic compatibility .....	11
2.4.2	Environmental conditions .....	13
2.5	Product safety.....	15
2.5.1	Protective equipment .....	15
2.5.2	Constructional changes, attachments, or modifications.....	16
2.6	Personnel qualification.....	16
2.7	Using personal protective equipment.....	16
2.8	Notes on particular risks.....	17
<b>3</b>	<b>Warranty.....</b>	<b>22</b>
<b>4</b>	<b>Scope of delivery .....</b>	<b>23</b>
<b>5</b>	<b>Accessories.....</b>	<b>24</b>
	<b>RVK .....</b>	<b>25</b>
<b>6</b>	<b>Technical data .....</b>	<b>26</b>
6.1	Basic data.....	26
6.2	Type designation .....	27
<b>7</b>	<b>Design and description .....</b>	<b>28</b>
7.1	Design .....	28
7.2	Description .....	28
<b>8</b>	<b>Assembly and settings .....</b>	<b>30</b>
8.1	Switching position .....	30
8.2	Mechanical connection .....	31
8.3	Gripper attachment.....	32
8.4	Air connections.....	34
8.5	Sealing air connection for external modules .....	35
8.6	Sensors/electrical connections.....	36
<b>9</b>	<b>Start-up.....</b>	<b>37</b>
9.1	Steps for commissioning .....	37

9.2	Starting up the module with ERS rotary drive .....	38
9.3	Pneumatic control .....	39
<b>10</b>	<b>Trouble shooting .....</b>	<b>41</b>
10.1	Gripper cannot be switched over in switching position .....	41
10.2	Gripper state in inactive position not as desired .....	41
10.3	Signal for monitoring gripper state is not present .....	41
10.4	Rotary drive does not move .....	41
<b>11</b>	<b>Maintenance and care .....</b>	<b>42</b>
11.1	Lubricants / lubrication points (basic lubrication) .....	42
11.2	Disassembly of the module .....	42
11.3	Wear parts .....	42
	<b>ERS 560V .....</b>	<b>43</b>
<b>12</b>	<b>Technical data .....</b>	<b>44</b>
12.1	Basic Data .....	44
12.1.1	Data ERS 135 560V .....	44
12.1.2	Data ERS 170 560V .....	47
12.1.3	Data ERS 210 560V .....	50
12.2	SCHUNK power and sensor cable .....	53
12.3	Optional holding brake .....	53
12.4	Pneumatic/electrical feed-through option .....	54
12.5	IP54 version .....	54
<b>13</b>	<b>Design and description .....</b>	<b>55</b>
13.1	Design .....	55
13.2	Description .....	55
13.3	Mechanische Schnittstellen .....	56
13.4	Electrical interfaces .....	56
13.5	Type key and name plate .....	57
13.6	Optional holding brake .....	58
<b>14</b>	<b>Assembly .....</b>	<b>59</b>
14.1	Mechanical connection .....	59
14.2	Electrical connection .....	62
14.3	Optional holding brake .....	66
14.3.1	Electrical connection .....	67
14.3.2	Dismantling micro valve .....	68
14.3.3	Installing and connecting the micro valve .....	69
14.3.4	Realigning the connection cable .....	71
<b>15</b>	<b>Start-up .....</b>	<b>72</b>

---










15.1 Start-up of the Bosch Rexroth IndraDrive C/CS .....	73
15.2 Start-up of the Siemens Sinamics S120 CU310/CU320.....	82
15.3 Inbetriebnahme des ERS mit einem beliebigen Umrichter .....	103
<b>16 Control parameters .....</b>	<b>104</b>
16.1 Bosch Rexroth IndraDrive C/CS-Basic setting .....	104
16.2 Siemens Sinamics S120 - series .....	105
<b>17 Trouble shooting .....</b>	<b>109</b>
17.1 ERS dreht sich nicht .....	109
17.2 ERS has regulation difficulties .....	110
17.3 ERS oscillates .....	110
17.4 Bearing noise .....	110
17.5 Error message for the winding temperature .....	111
<b>18 Maintenance and care .....</b>	<b>112</b>
18.1 Maintenance and lubrication intervals .....	112
18.2 Module Servicing.....	113
18.3 Modul zerlegen.....	113
<b>19 Transport, storage and disposal.....</b>	<b>114</b>
19.1 Transport .....	114
19.2 Packaging.....	114
19.3 Storage.....	115
19.4 Disposal.....	115
<b>20 Assembly drawings.....</b>	<b>116</b>
20.1 ERS 135 .....	116
20.2 ERS 170 .....	117
20.3 ERS 210 .....	118
<b>21 Translation of original declaration of incorporation .....</b>	<b>119</b>


## 1 About this manual

This instruction is an integral part of the product and contains important information for a safe and proper assembly, commissioning, operation, maintenance and help for easier trouble shooting. Before using the product, read and note the instructions, especially the chapter "Basic safety notes".

### 1.1 Warnings

To make risks clear, the following signal words and symbols are used for safety notes.

	<div> <b>DANGER</b></div> <div><b>Danger for persons.</b> Non-compliance will inevitably cause irreversible injury or death.</div>
	<div> <b>WARNING</b></div> <div><b>Dangers for persons.</b> Ignoring a safety note like this can lead to irreversible injury and even death.</div>
	<div> <b>CAUTION</b></div> <div><b>Dangers for persons.</b> Non-observance can cause minor injuries.</div>
	<div><b>NOTICE</b></div> <div><b>Material damage</b> Information about avoiding material damage.</div>
	<div> <b>WARNING</b></div> <div><b>Warning about dangerous electrical voltage</b></div>

	<div data-bbox="507 159 748 210"> <b>WARNING</b></div> <div data-bbox="494 226 904 266"><b>Warning about hot surfaces</b></div>
---	--

## 1.2 Applicable documents

- General terms of business
- Catalog data sheet of the purchased product
- Assembly and Operating manuals of the accessories
- Catalog data sheet for the attached rotary module
- Assembly and operating manual for the attached rotary module
- SCHUNK CD with:
  - Motion Tool Schunk software (MTS)
  - EEPROM files for the MCS 12 controller
  - FB20 function module for Siemens S7-300/400 for controlling SCHUNK modules

The documents listed here, can be downloaded on our homepage **[www.schunk.com](http://www.schunk.com)**

## 2 Basic safety notes

### 2.1 Intended use

The product has been designed for reliable gripping, pivoting (with specified cycle types) and collecting of workpieces or objects in conjunction with suitable grippers and turning devices.

The product may only be operated in conjunction with a controller.

The product is intended for installation in a machine/system. The requirements of the applicable guidelines must be observed and complied with.

The product may be used only in the context of its defined application parameters ([👉 6, Page 26](#)).

The product is designed for industrial use.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.

### 2.2 Not intended use

Use which is not specified as an intended use is for instance when the product is for example used as a pressing tool, stamping tool, lifting tool, guide for tools, cutting tool, tensioning mean, boring tool.

### 2.3 General safety notes

- Observe these safety notes and supplementary instructions for use prior to starting work with the product.
- Carefully read through all the documents supplied before starting up or using the product.
- Please refer to the documentation for the connecting and installing conditions and the technical data and restrictions and observe these at all times. Every person called upon by the operator to work on the product must have read and understood the complete assembly and operating manual. This applies in particular to occasional personnel, such as maintenance personnel.



- The product may pose a danger, for instance in the following situations:
  - When the product is not used in accordance with its appropriate use.
  - When the product is not installed or maintained properly.
  - When the safety notes or assembly instructions are not observed.
- Avoid any manner of working that may interfere with the functioning and operational safety of the product.
- Do not start up a damaged or faulty product.
- Only use spare parts and accessories that have been authorized by SCHUNK. Leave the hardware components in their original state and do not manipulate them or the software without the express consent from SCHUNK. Additional bore holes, threads or attachments, that are not offered by SCHUNK as accessories, may impair the safety of the product and are only permitted with the approval of SCHUNK.
- Error-free and safe operation of the product requires proper transportation and storage, observation of the assembly and installation regulations that apply to the product, as well as careful and responsible operation and servicing.
- Improper handling of the product, failing to observe the safety notes and manipulating the maintenance products may damage the product and also cause serious injury.
- A risk assessment must be created for the system or machine into which the product is to be installed. The operator must product monitoring strategies and superordinate measures for personal protection based on the risk analysis. In this the safety rules that apply to the entire system or machine must be taken into account.

## 2.4 Environmental and operating conditions

- Make sure, that the product may be used only in the context of its defined application parameters ([👉 6, Page 26](#)).
- Observe Maintenance and lubrication intervals ([👉 18.1, Page 112](#)).
- Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Exceptions are products that are designed especially for contaminated environments.
- Make sure that the product is not exposed to excessive vibrations and/or strokes.
- Ensure that no strong magnetic fields impair the function of the product.  
Contact your SCHUNK partner if the product is to be used in strong magnetic fields.

### 2.4.1 Electromagnetic compatibility

The module fulfills the requirements of the EMC law of the Single European Market. The devices passed the EMC test in accordance with the following standards:

Standard	Title
EN 61000-6-2 (2006)	EMC: Generic standard – Immunity in industrial environments
EN 61000-6-3 (2011)	EMC: Generic standard – Emission standard for residential and light industrial environments

The EMC-compliant installation of the product and the use of interference resistant wiring are necessary for trouble-free operation.

**Interference variables:** Pulsed interference variables:

**les:** The following table shows the electromagnetic compatibility with respect to pulsed interference variables.

Pulsed interference variable	Tested with	Corresponds to intensity
Electrostatic discharge according to EN 61000-4-2 (2008)	Air discharge: 8 kV Contact discharge: 4 kV	3
Burst pulse, fast transient interference variables according to EN 61000-4-4 (2008)	Supply line: + - 2 kV On signal, data and control line: + -1kV	3
High-energy single pulse (surge) EN 61000-4-5	+ - 500V, surge symmetrical, + - 500V, surge asymmetrical (length of lead > 30 m)	1

**Sinusoidal interference variables:**

The following table shows the electromagnetic compatibility with respect to sinusoidal interference variables

Sinusoidal interference variable	Test values	Corresponds to intensity
HF irradiation (electromagnetic fields) according to EN 61000-4-3	80 % amplitude modulation at 1kHz to 10 V/m in the range from 80 ... 1000 MHz to 3 V/m in the range from 1.4 ... 2 GHz to 1 V/m in the range from 2 ... 2.7 GHz	3
HF energizing on lines and shields according to EN 61000-4-6	Test voltage 10 V with amplitude modulation 80 % of 1 kHz in the range from 150 kHz ... 80 MHz	3

**Emission of radio interference** The emission was tested according to EN 61000-6-3 and confirmed.

Wire conducted emission	Value
0.15 ... 0.5 MHz	< 66 dB (μV) quasi peak, < 56 dB (μV) mean value < 56dB (μV) quasi peak, < 46 dB (μV) mean value < 60 dB (μV) quasi peak, < 50 dB (μV) mean value
0.5 ... 5 MHz	
5 ... 30 MHz	

The following table shows the emission of electromagnetic fields according to EN 55011:2009, limit class A, group 1, measured at a distance of 10 m

Interference variable	Value
30 ... 230 MHz	< 30 dB (μV) quasi peak, measured at 10 m
230 ... 1000MHz	< 37 dB (μV) quasi peak, measured at 10 m

## 2.4.2 Environmental conditions

**Requirements for transport and storage** This product exceeds the requirements of IEC 61131-2:2007 with respect to permissible environmental conditions. The following information applies if the product is transported and stored in the original package.

**Mechanical environmental conditions** Standard: IEC 60721-3-2 (version 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2M2 applies.

**Climatic environmental conditions** Standard: IEC 60721-3-2 (version 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2K4 applies.

The aforementioned standards result in the following parameters for the essential environmental conditions. The information applies if the product is transported and stored in the original package.

Environmental condition	Value	Note
Free fall EN 60068-2-32	$\leq 0.3$ m	In the transport package: 5 g
Temperature EN 60068-2-2	+70° C	Test Bb, dry heat, storage
Temperature EN 60068-2-1	-40° C	Test Ab, cold, storage
Temperature shock EN 60068-2-14	-40 ... +70° C	Test Na, holding time 3 h, 5 cycles
Air pressure IEC 60068-2-13	1140 ... 660 hPa	Corresponds to an elevation of -1000 ... 3500 m

**Requirements during operation** The following overview shows the permissible environmental conditions for the product.

**Mechanical environmental conditions** Standard: IEC 60721-3-2 (version 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3M3 applies.

**Climatic environmental conditions** Standard: IEC 60721-3-2 (version 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3K3 applies

The aforementioned standards result in the following parameters for the essential environmental conditions.

Environmental condition	Value	Note
Temperature EN 60068-2-2	+55° C	Relative humidity 55 , non-condensing, dry heat, in operation
Temperature EN 60068-2-1	0° C	Cold, storage, in operation
Temperature EN 60068-2-30	+25 ... +55° C	Humid heat, cyclic

The product may be used at the following locations only if additional measures are taken:

- locations with high content of ionizing radiation
- locations with extreme operating conditions, such as caustic vapors, gases, oils or chemicals
- systems requiring special monitoring, such as high-risk rooms

In addition, the product is not approved for use in potentially explosive zones. If the product is subjected to excessively high jolts or vibrations, suitable measures must be taken to damp the amplitudes or accelerations of these interference factors. In such cases, use systems to damp or eliminate the vibrations.

**Tests under environmental conditions Tests with respect to mechanical environmental conditions**

The following table shows the type and scope of inspections for which the product was tested with respect to mechanical environmental conditions.

Test	Physical variable	Value, comment
Vibrations EN 60068-2-6 (Version 2008)	Vibration	Sinus
	Frequency range	5 ... 500 Hz Deflection 10 mm
		5 ... 500 Hz Vibration acceleration 30 m/s <sup>2</sup>
Shock EN 60068-2-27 (Version 2009)	Shock form	Half-sine
	Peak acceleration	250 m/s <sup>2</sup>
	Pulse duration	11 ms
	Number of shocks per direction	50 per axis
	Number of axes	3

## 2.5 Product safety

Dangers arise from the product, if:

- the product is not used in accordance with its intended purpose.
- the product is not installed or maintained properly.
- the safety and installation notes are not observed.

Avoid any manner of working that may interfere with the function and operational safety of the product.

Wear protective equipment.

### NOTE

More information are contained in the relevant chapters.

### 2.5.1 Protective equipment

Provide protective equipment per EC Machinery Directive.

### **2.5.2 Constructional changes, attachments, or modifications**

Additional drill holes, threads, or attachments that are not offered as accessories by SCHUNK may be attached only with permission of SCHUNK.

## **2.6 Personnel qualification**

- Only qualified personnel may operate the product or work in its vicinity.
- Personnel must be familiar with the required safety equipment, know how to use it and be trained in First Aid.
- Work on the electrical installations shall only be performed by electricians or instructed personnel under the guidance and supervision of an electrician, and in accordance with the electrical standards.
- Observe the national accident prevention regulations and the general safety notes.

## **2.7 Using personal protective equipment**

When using this product, observe the relevant industrial safety regulations and use the personal protective equipment (PPE) required!

- Use protective gloves, safety shoes and safety goggles..
- Observe safe distances.



## 2.8 Notes on particular risks

### General information

- Observe safe distances.
- Observe the minimum safety requirements for the use of equipment.
- Never take safety devices out of operation.
- Install the provided protective devices in the danger zone before switching the product on.
- Remove the energy supplies before installation, modification, maintenance, or adjustment work. Ensure that no residual energy remains in the system.
- Do not move parts by hand when the energy supply is connected.
- Do not reach into the open mechanism or the movement area of the product.
- Perform maintenance, modifications, and additions outside the danger zone.
- When carrying out any work, secure any module connected to the product from accidental operation.
- Take particular care during maintenance and disassembly.
- Only trained staff may perform disassembly work.

### Protection during handling and assembly

- There is a risk of injury when handling the product incorrectly. Only trained staff may perform maintenance and assembly work. For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

### **Protection against dangerous movements**

Dangerous movements may be caused by faulty actuation of drives that are connected

Dangerous movements may be caused by operating mistakes or faulty parameterization during start-up or by software errors.

- Never rely merely on the response of the monitoring function to avert danger. Assume that the drive movement is faulty as long as the installed monitors are not effective, since the effect depends on the control and the current operating state of the drive. Perform maintenance, modification and attachment work outside of the danger zone defined by the movement range.
- To avoid accidents and/or material damage, access to the movement area of the machine must be restricted. Restrict accidental access of persons in this area, e.g. by providing a protection cover, a protective fence or a photoelectric barrier. The protection cover and the protective fence must have sufficient stiffness to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily accessible. Before starting up the machine or system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function.

### **Electric components**

- Work on the electrical installations shall only be performed by electricians or instructed personnel under the guidance and supervision of an electrician, and in accordance with the electrical standards.
- Observe the general set-up and safety rules applicable when performing work on power plants.
- Lay electric lines according to the rules of the profession, e.g. in a cable duct or a cable bridge. Observe cable laying standards.
- Before connecting or disconnecting electric cables, switch off the power supply and check that lines are dead. Secure power supply against reactivation.









- Disconnect the product from the mains prior to commencing work on it and wait for at least 15 minutes for dangerous voltages to disappear (capacitor charge). Check that the product is deenergized before you start work.
- Before switching on the product, check whether the protective conductor on all electric components has been installed correctly and according to the connection diagram.
- Check whether covers and protective equipment have been attached to prevent touching live components.
- Do not touch the connecting elements of the product, when the power supply is switched on.

### **Magnetic and electromagnetic fields**

- Persons with pace-makers, metal implants, metal shards or hearing aids require the consent of a physician before entering areas in which components of the electric drive and control systems are mounted, started up and operated.
- Persons with pace-makers, metal implants, metal shards or hearing aids required the consent of a physician before entering areas in which motor parts with permanent magnets are stored, repaired or assembled.
- Do not operate high-frequency or radio products in the proximity of electric components of the drive system and their feed lines. If using such devices is necessary: Check the machine or system for possible failures when using such devices at different intervals and in different states of the control system when starting-up of the electric drive and control system. You may need to carry out an additional specific EMC control if the system's risk potential is high.

### **Hot surfaces**

- Do not touch hot surfaces (e.g. brake resistors, heat sinks, drive units, windings and sheet packets). It may take up to one hour for some components to cool off after they have been switched off. If necessary, wear personal protective equipment (gloves).

	<div data-bbox="496 150 1445 219"> <b>DANGER</b></div> <div data-bbox="496 219 1445 465"><p><b>Risk of electric shock due to contact with live parts!</b></p><ul style="list-style-type: none"><li>• Before conducting work on the machine and the auxiliary equipment, disconnect them from the power supply and make sure they cannot be switched back on again.</li><li>• Wait until the frequency controller is discharged.</li></ul></div>
	<div data-bbox="496 517 1445 586"> <b>WARNING</b></div> <div data-bbox="496 586 1445 736"><p><b>Risk of injury from objects falling and being ejected</b></p><ul style="list-style-type: none"><li>• The danger zone must be surrounded by a safety fence during operation.</li></ul></div>
	<div data-bbox="496 788 1445 857"> <b>WARNING</b></div> <div data-bbox="496 857 1445 1317"><p><b>Risk of injury due to moving parts if these are controlled incorrectly!</b></p><p>Possible causes for control errors:</p><ul style="list-style-type: none"><li>• Incorrect cabling or wiring</li><li>• Removal of safety devices</li><li>• Software errors</li><li>• Sensor and signal transmitter errors</li><li>• Entry of incorrect parameters prior to start-up</li><li>• Defective module</li></ul></div>
	<div data-bbox="496 1368 1445 1438"> <b>WARNING</b></div> <div data-bbox="496 1438 1445 1574"><p><b>Risk of injury due to rotating components!</b></p><p><i>Avoidance:</i> The danger zone must be surrounded by a safety fence during operation.</p></div>

**WARNING****Risk of burns due to contact with hot surfaces!**

During operation, the surface temperature may exceed 85°C (185°F).

- Allow the module to cool down to at least 40°C (104°F) before working on the module.
- Measure the surface temperature before touching the module.
- Wear protective gloves, if necessary.

### 3 Warranty

If the product is used as intended, the warranty is valid for 24 months from the date of delivery from the production facility under the following conditions:

- Observance of the ambient conditions and operating conditions ([☞ 2.4, Page 10](#))
- Observe the mandatory maintenance and lubrication intervals. ([☞ 11, Page 42](#))

Parts touching the work piece and wearing parts are not part of the warranty.

## 4 Scope of delivery

The scope of delivery includes

- Revolving unit with ERS 560V Rotary Module RVK 100 in the ordered model.
- SCHUNK CD with:
  - Parameter files for Bosch Rexroth IndraDrive C/CS converter
  - Parameter files for Siemens Sinamic S 120 CU310-DP and S 120 CU320-DP converters
- Accessory pack

## 5 Accessories


The following accessories that are required for the module must be ordered separately:

- Adapter plates
- Grippers
- Sensors
- Cable set (power/sensor cables)
- Y-distributor ID no. 9957232
- Sensor cable ID no. 9957233

We recommend the following accessories for the module:

- Converter:  
Bosch IndraDrive C /CS including user manual  
or  
Siemens Sinamics S 120 CU310-DP or S 120  
CU320-DP including user manual

A wide range of accessories is available for this module.

For information about which accessories can be used with the appropriate product version  catalog.

### Sensors

- Refer to the catalog for selection of and the exact type designation of sensors that match the respective gripper attachment.
- Information on handling sensors is available at [www.de.schunk.com](http://www.de.schunk.com) or from SCHUNK contact persons.



Part

---

RVK




## 6 Technical data

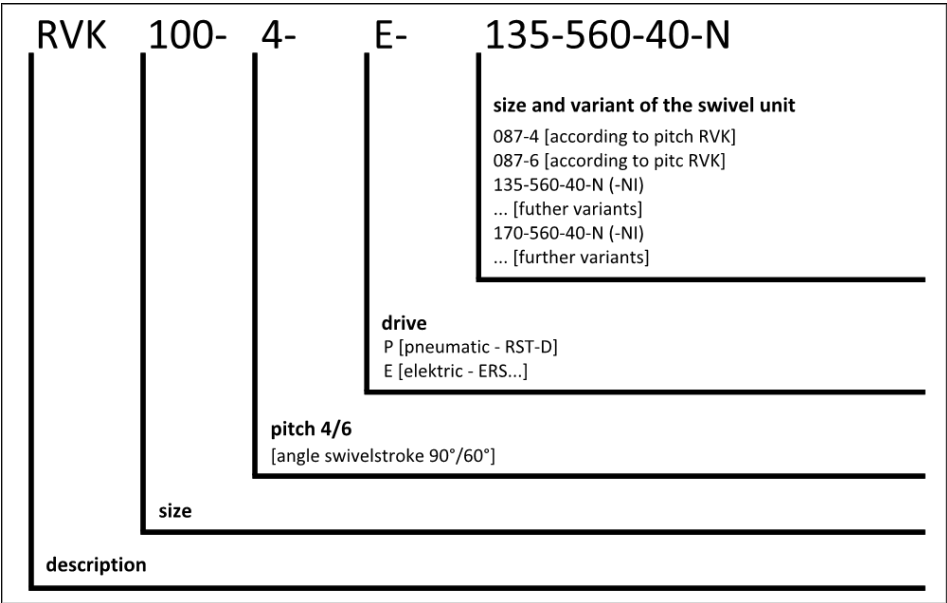
### 6.1 Basic data

Designation	RVK 100
Min. ambient temperature [°C]	+ 5 *
Max. ambient temperature [°C]	+ 60 *
IP rating	40 *
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:7 4 4
Nominal working pressure [bar]	6
Min. pressure [bar]	3
Max. pressure [bar]	8
Max. voltage of el. feed-through [VDC]	120
Max. current/channel of el. feed-through [A]	1
Max. speed of rotation < 90° [rpm]	240
Max. speed of rotation < 720° [rpm]	120
Max. speed of rotation unlimited [rpm]	60
* Pay attention to the data of the attached gripper	

More technical data are included in the catalog data sheet. Whichever is the latest version.

	<b>NOTICE</b>
	<p><b>Changing from oiled to oil-free compressed air will result in damage to the module!</b></p> <p>If oil-free compressed air is used, the factory lubrication can be washed out if previously operated with oiled compressed air.</p> <ul style="list-style-type: none"> <li>Do not operate the module with oiled compressed air prior to operation with oil-free compressed air.</li> </ul>

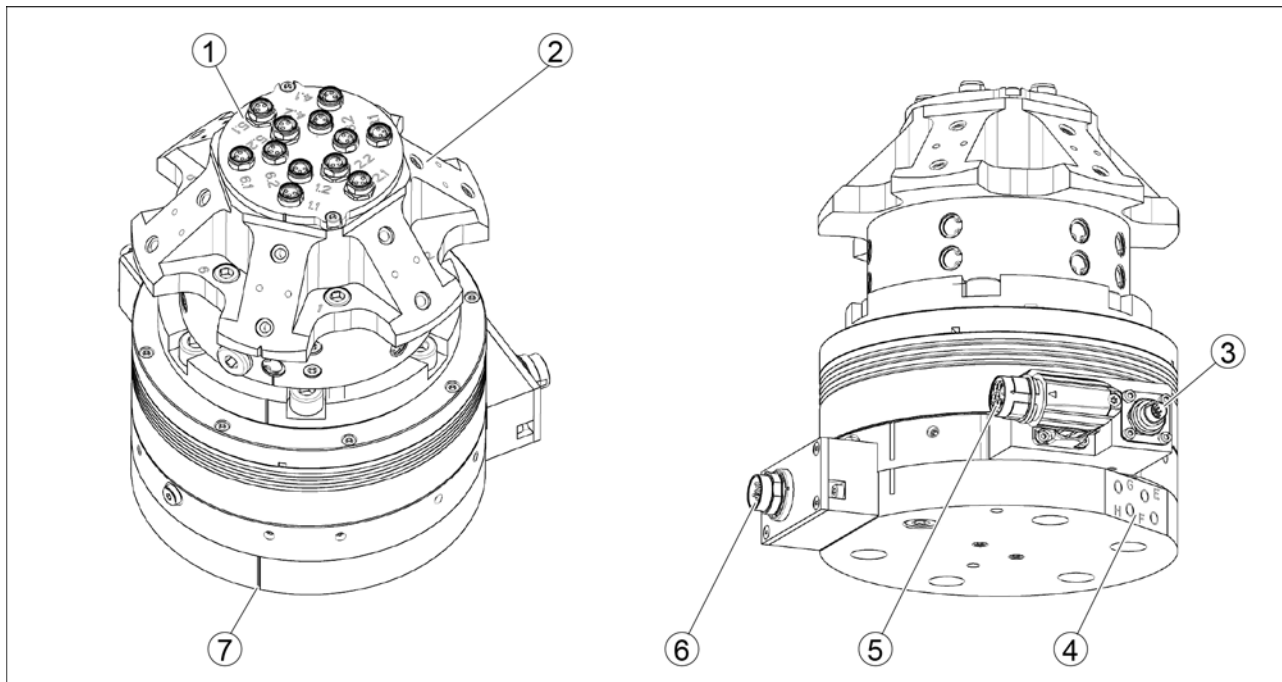
6.2 Type designation



Type designation

## 7 Design and description

### 7.1 Design



Version of electric rotary drive

Item	Designation	Item	Designation
1	Gripper monitoring connections	5	Power connection of rotary module
2	Gripper spaces with air bores for direct connection	6	Gripper monitoring main connection
3	Sensor connection of rotary module	7	Marking groove, position of individual gripper control
4	Central air connections for control		

### 7.2 Description

The revolving unit is a module on which 4 or 6 grippers can be swiveled with one pneumatic or electric rotary drive.

Control of the gripper can take place

- in any position for all grippers simultaneously or
- at a specific position for one gripper individually, without changing the state of the other grippers. This is achieved by means of a central valve mechanism, which engages from the fixed middle section into the turning outer section.

The states of all grippers can be monitored continuously and centrally.

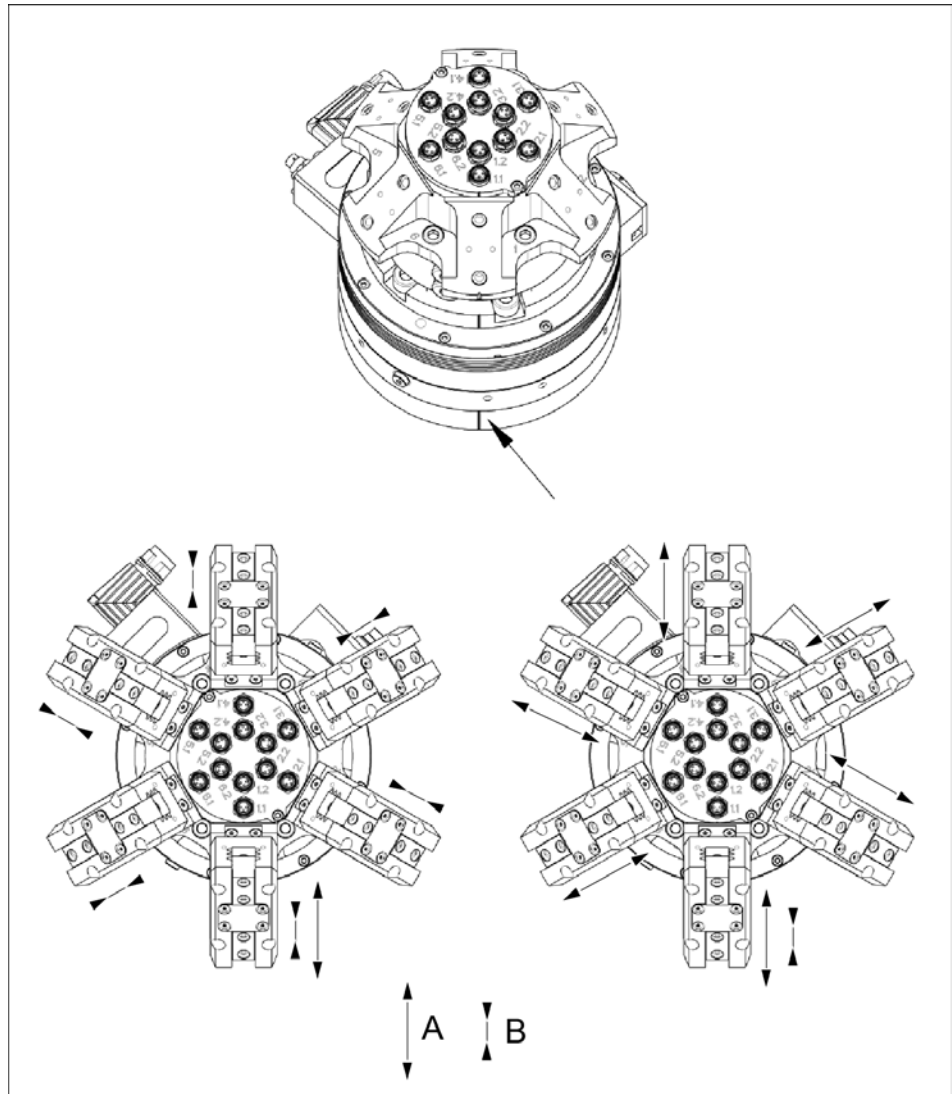
A practical application, for example, would be as a collect and place unit on a 3D gantry or robot.

## 8 Assembly and settings

### 8.1 Switching position

On the turret, the system only individually controls the gripper that is located at the switching position.

The switching position is marked on the baseplate.



Switching position

## 8.2 Mechanical connection



### WARNING

**Warning: Risk of injury when the machine/system moves unexpectedly!**

Remove the energy supplies before starting with assembly and adjustments.

Make sure that no residual energy remains in the system.

### Check the evenness of the bolting surface

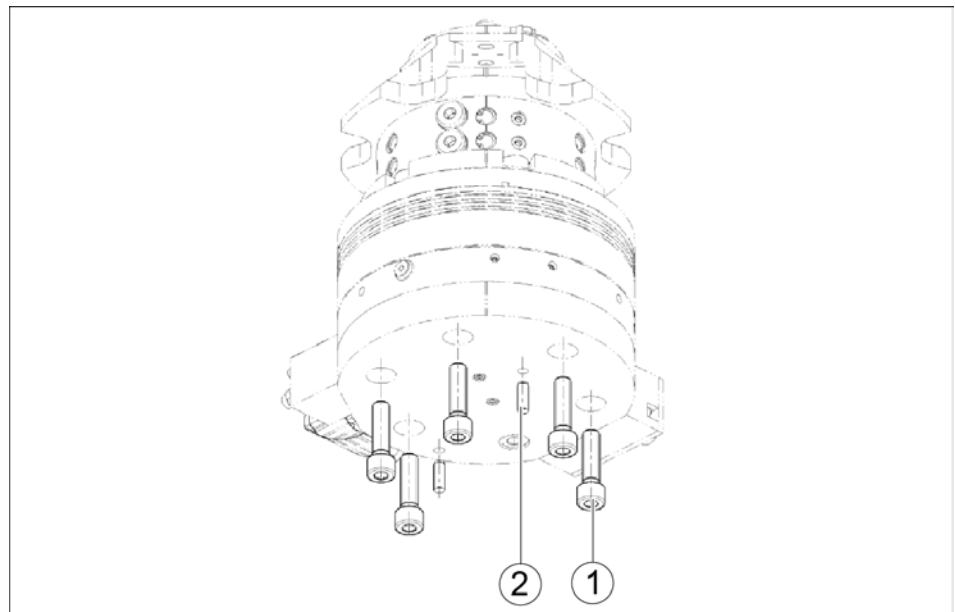
The values relate to the entire bolting surface.

Requirements for levelness of the bolting surface (Dimensions in mm)

Diameter	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

### Mounting the turret

The turret is mounted on the base side. It can be installed at any position.

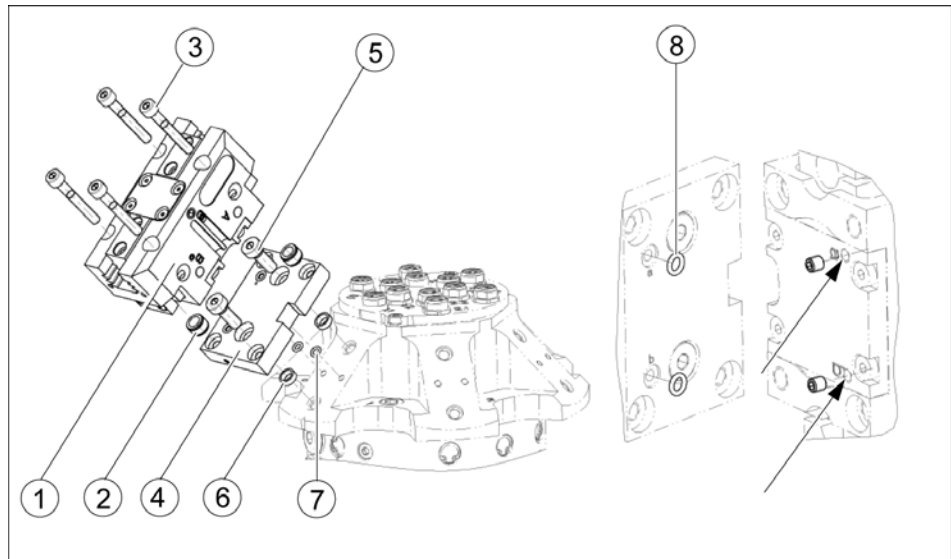


Mechanical connection

Item	Designation	RVK100 with ERS 135	RVK100 with ERS 170
1*	Screw, ISO 4762	M8 (5x)	M10 (5x)
2*	Cylindrical pin, ISO 8734	Ø5 (2x)	Ø5 (2x)
* Provided by the customer			

### 8.3 Gripper attachment

- Adapter plates**
- 1 Use suitable adapter plates to bolt the gripper to the revolving unit; see catalog for adapter plates.
  - 2 Align adapter plates; see graphic “Mounting of gripper”.
- Grippers**
- 1 Use the direct connections of the grippers at the base for mounting.
  - 2 Align gripper; see graphic “Mounting of gripper”.



Gripper attachment

Pos.	Bezeichnung	Pos.	Bezeichnung
1*	Grippers	5***	Screw DIN 7984
2**	Centering sleeve	6***	Centering sleeve
3*	Screw ISO 4762	7***	O-ring
4*	Adapter plate	8***	O-ring
* to be provided by customer ** included in enclosed pack ***included in adapter plate enclosed pack			





### NOTICE

#### Damage to the module is possible!

Observe the following during assembly of the module:

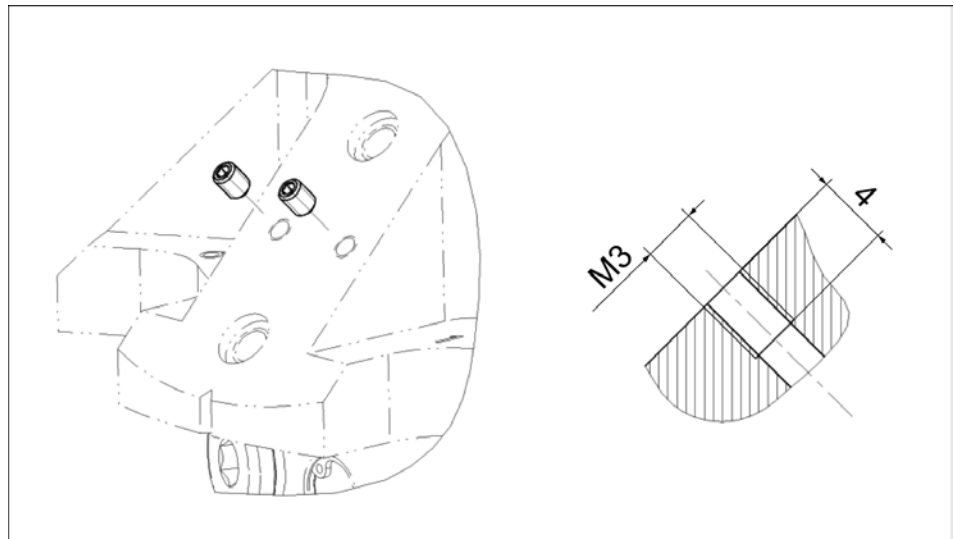
- When mounting loads, take measures to prevent impermissible forces and torques; see catalog data sheet.
- Select the suitable screw tightening torque for mounting the module or for mounting loads on the module in accordance with the generally applicable directives for screw connections.
- Secure all screws with a suitable chemical thread locking agent.

### Non-occupied gripper positions

#### NOTE

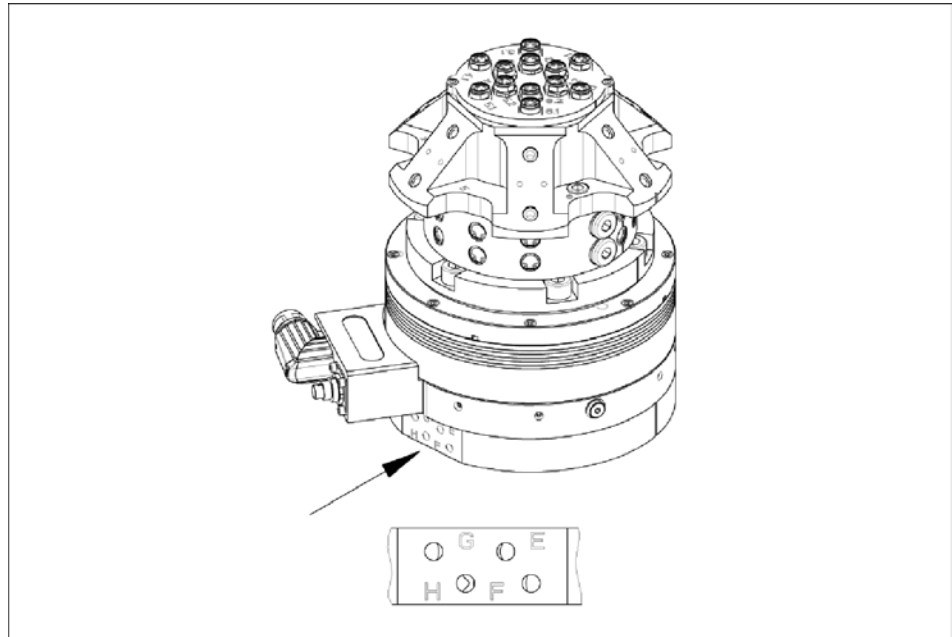
Only occupied gripper positions are sealed.

- 1 Close the air connection holes of non-occupied gripper positions with set screws and a suitable thread seal.



Sealing of air connection

## 8.4 Air connections



Air connection

Item	Description	Thread
E	Compressed air supply/air bleed screw	M5
F	Air bleed screw/compressed air supply	
G	Switching position inactive	
H	Switching position active	

For more information, see the catalog data sheet.

### NOTE

Observe the requirements for the air supply, ([👉 6, Page 26](#)).

## 8.5 Sealing air connection for external modules

On the revolving unit there are two connections that are directly connected with the pressure areas/connections E and F.

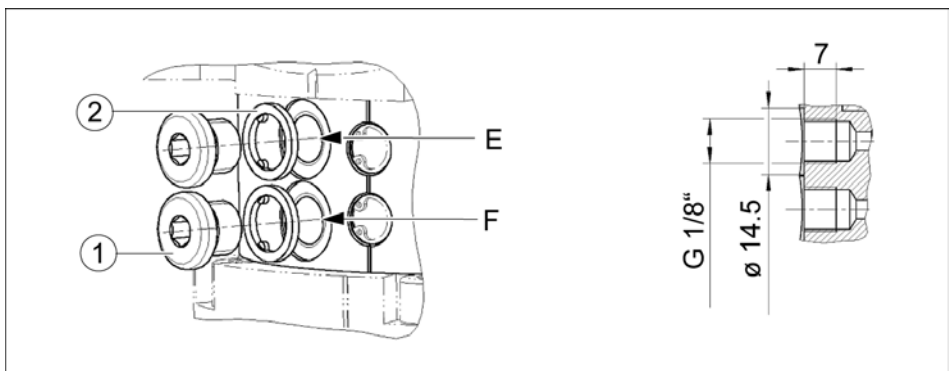
The two connections can be used as sealing air connections for the external modules.



### NOTICE

The two connections that are directly connected with the pressure areas/connections E and F are not regulated.

If the connections are used as sealing air connections, suitable pressure reducers/regulators must be used.



Sealing air connection

Pos.	Bezeichnung	Pos.	Bezeichnung
1	Locking screw	2	Sealing disk G1/8"

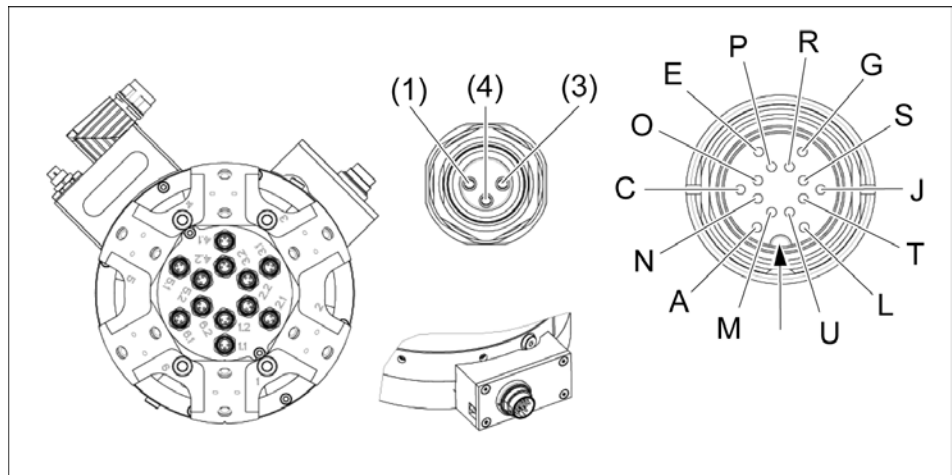
## 8.6 Sensors/electrical connections

To monitor the status of each gripper, two 3-pin connections each are available for M8 sensors.

### NOTE

Use SCHUNK standard sensors.

The system picks up signals from the sensors and supplies power to them via the main connection, a 14-pin M16 female connector on the baseplate.



Main connection of sensors

A	C	E	G	J	L	M
+24V	S1.1	S1.2	S2.1	S2.2	S3.1	S3.2


  

N	O	P	R	S	T	U
S4.1	S4.2	S5.1	S5.2	S6.1	S6.2	GND

## 9 Start-up

### 9.1 Steps for commissioning

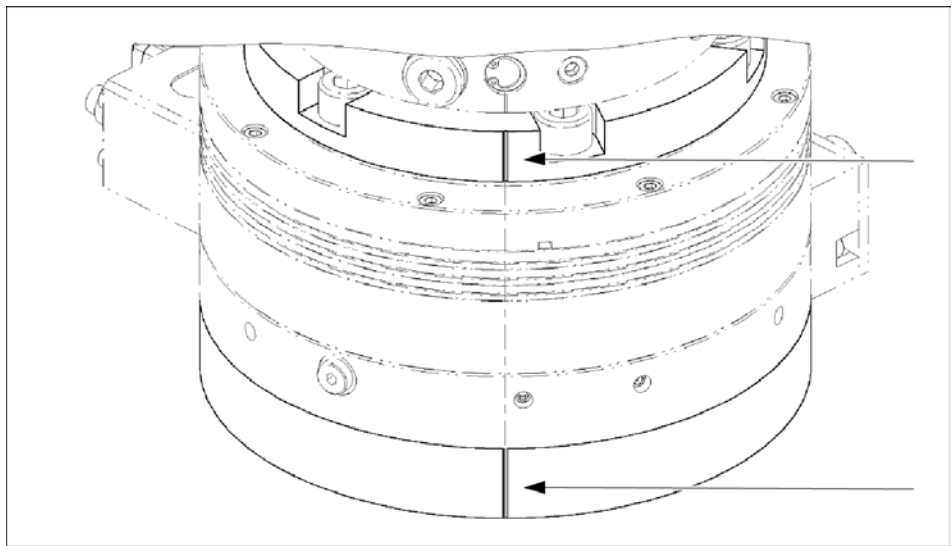
- 1 Checking technical data
- 2 Check all modules. Take into account all permissible operating parameters.  
⇒ All modules function properly.

	<b>NOTICE</b>
	<p><b>Damage to the rotary module is possible.</b> Check rotary module and ensure correct operation of the modules.</p> <ul style="list-style-type: none"><li>• Mechanical impacts by the modules on the revolving unit must be prevented, for example due to incorrect configuration or malfunction of the shock absorbers of the pneumatic rotary module.</li></ul>

- 3 Check rotary module.  
⇒ Rotary module functions properly.

## 9.2 Starting up the module with ERS rotary drive

- ✓ The module is installed mechanically
- ✓ All the grippers are mounted mechanically
- ✓ The air bores on unused mounting surfaces are sealed off
- 1 Connect all the energy lines (compressed air).
- 2 Connect the sensors and the main plug.
- 3 Deactivate the switching position of the turret.
- 4 Put the ERS into service; refer to the operating and assembly manual for the ERS rotary drive.



Marking grooves

- 5 Approach the zero position (position of the device as specified in the catalog/Cadenas).
  - ⇒ Position  $\pm 0.1^\circ$
  - ⇒ The marking grooves are located above one another; see the "Marking grooves" diagram.
- 6 **Or:** As an alternative to approaching the zero position.
  - ⇒ Align the marking grooves; see the "Marking grooves" diagram.
  - ⇒ Activate the switching position of the turret.
  - ⇒ Teach in the zero point.
- 7 Parameterize the pitches (4x90° / 6x60°) starting from the zero point.
  - ⇒ The turret can be operated, ([🔗 9.3, Page 39](#)).

### 9.3 Pneumatic control

The air connections on the bolting surfaces of the gripper are supplied by two pressure areas. The pressure areas are ring-shaped around the fixed inner ring.

Connect E supplies air and connection F purges air or vice versa.

All grippers are connected to these areas. Switch-over of the pressure state causes all grippers to be switched over.

The gripper can be switched over in switching position. The internal valve mechanism is switched from

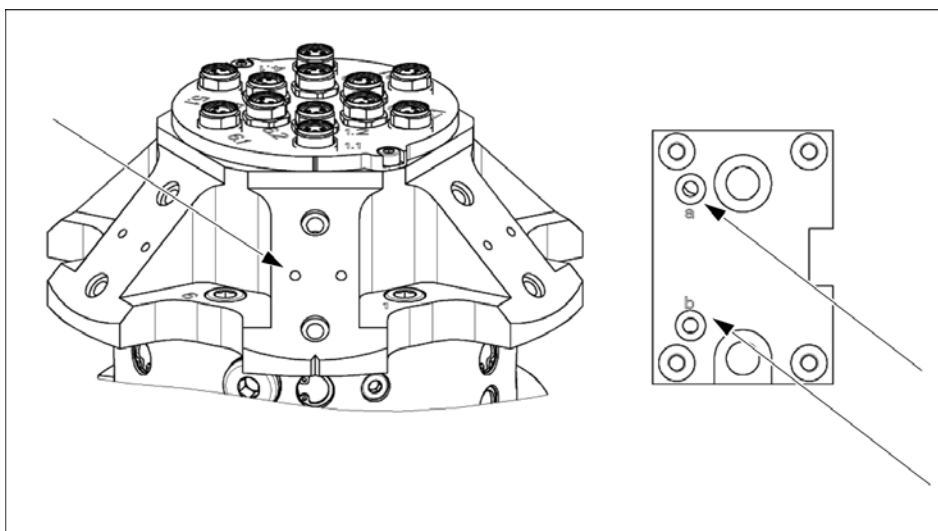
- **Active:** connection G supplies air, connection H purges air to
- **Inactive:** connection H supplies air, connection G purges air




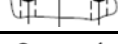



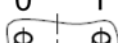


#### NOTICE

##### **Danger of mechanical damage**

The rotary drive that is used may continue rotating only when the valve is switched to inactive.



Air holes for adapter plate and gripper head

Control of pressure connection				Valve switchin g	Rotary move- ment	Air hole in bolting surface			
Pressure area		Valve				Gripper on circumference		Gripper switching position	
E	F	G	H						
1	0	1	0	inactive	yes	close (b)	<div>10</div> 	close (b)	<div>10</div> 
0	1	1	0	inactive	yes	open (a)	<div>01</div> 	open (a)	<div>01</div> 
1	0	0	1	active	no	close (b)	<div>10</div> 	open (a)	<div>01</div> 
0	1	0	1	active	no	open (a)	<div>01</div> 	close (b)	<div>10</div> 



## 10 Trouble shooting

### 10.1 Gripper cannot be switched over in switching position

Mögliche Ursache	Maßnahmen zur Behebung
Pressure drops below minimum	Check air supply, ( <a href="#">☞ 6.1, Page 26</a> ).
Compressed air hoses interchanged / connected incorrectly	Check compressed air hoses, Air connections.
Position of switching position was not approached exactly by the rotary module	Electric rotary drive: Check configuration of the rotary drive, ( <a href="#">☞ 9.2, Page 38</a> ).  Pneumatic rotary drive: Check whether the rotary drive is in completely locked position; see operating manual for RST-D.
Other	See operating manual for gripper.

### 10.2 Gripper state in inactive position not as desired

Mögliche Ursache	Maßnahmen zur Behebung
Compressed air connections E and F are incorrectly connected or controlled	Check compressed air hoses, Air connections.

### 10.3 Signal for monitoring gripper state is not present

Mögliche Ursache	Maßnahmen zur Behebung
Sensor on gripper is incorrectly adjusted	Readjust sensor; see operating manual for gripper.
Sensor defective	Replace sensor; see operating manual for sensor.
Broken cable	Replace connection cable for sensor

### 10.4 Rotary drive does not move


Mögliche Ursache	Maßnahmen zur Behebung
Valve switching is active	Before initiating the rotary movement always first switch the valve to inactive (supply connection G, purge connection H), ( <a href="#">☞ 9.3, Page 39</a> ).
Other	See operating manual for rotary drive.

## 11 Maintenance and care

### 11.1 Lubricants / lubrication points (basic lubrication)

The module features life-time lubrication and requires no lubrication during operation.

### 11.2 Disassembly of the module

	<b>NOTICE</b>
	<p><b>Damage to the module is possible!</b></p> <p>Dismantling of the module must be carried out by SCHUNK, since otherwise the mechanical components and internal electronics can be damaged.</p> <p>Only the grippers and adapter plates mounted by the customer may be removed.</p>

### 11.3 Wear parts

The expected life span depends on the specific application. The information on the life span should therefore be regarded as approximate.

Wearing part	Life span	Note
Slip ring (signal feed-through)	3,000,000 revolutions	Replacement only at the factory
Radial seals	8,000,000 revolutions	
Valve mechanism with seals	10,000,000 valve switching cycles (control G/H)	

Part

---

ERS 560V



## 12 Technical data

### 12.1 Basic Data

More technical data are included in the catalog data sheet. Whichever is the latest version.

#### 12.1.1 Data ERS 135 560V

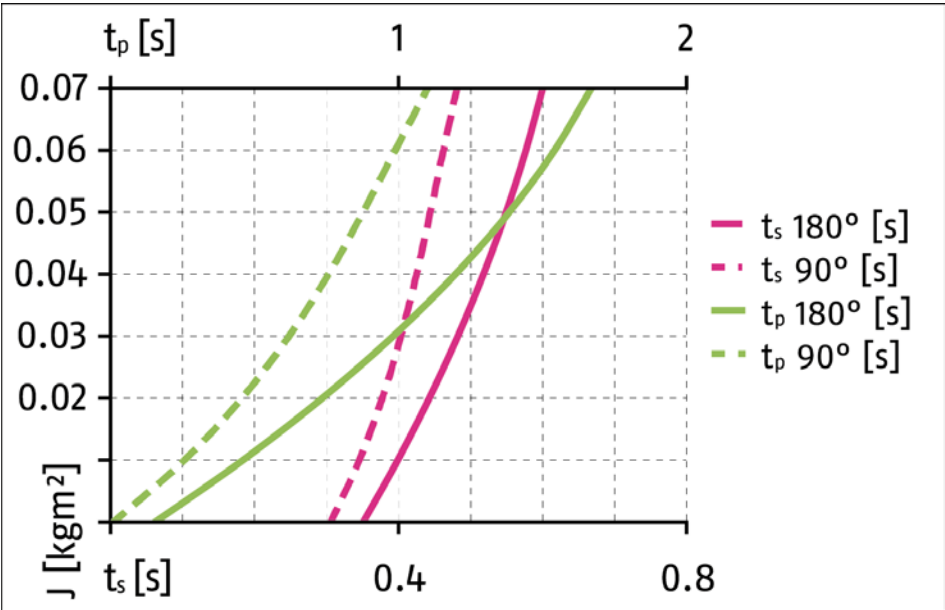
##### NOTE

The Rotary Module ERS has to be mounted on a thermally well-conducting surface.

Mechanical operating data	
Heat conduction surface [mm <sup>2</sup> ]	57686
Eigenmasse [kg]	2.7
Maße	135 x 63
Center bore (Ø) [mm]	15
Umgebungstemperatur [°C]	
Min.	+5
Max.	+55
Mass moment of inertia of rotating parts [kgm <sup>2</sup> ]	0.001431
Max. permissible mass moment of inertia [kgm <sup>2</sup> ]	0.072
Rotation range [°]	>360 (turning endlessly)
Repeat accuracy [°]*	0.01
* Distribution of the end positions of 100 successive motions. When approaching from the same direction.	
Measuring system	Incremental
Dichtheit IP	40
Permissible operating mode	S1 - continuous operation**
** Applies only if the preconditions in chapter "Mechanical connection" ( <a href="#">👉 14.1, Page 59</a> ) are fulfilled. Otherwise, S6 - continuous mode with intermittent load is the permitted operating mode.	
Specifications for the integrated motor	
Motor type	Synchronous
Circuit	Star
Temperature sensor (type)	KTY84-130
Max. permissible operating temperature [°C]	+95

Insulation class	Class F DIN 57530
Output shaft power $P_n$ [kW]	0.24
Intermediate circuit voltage $U_{zk}$ [V]	560
Rated torque $M_n$ [Nm]	2.5
Nominal current $I_{rms}$ [A]	1.2
Peak current $I_{max}$ [A]	3.8
Torque constant $K$ [Nm/A]	1.9
Rated speed $n_n$ [rpm]	1000
Max. speed $n_{max}$ [rpm]	2300
Winding resistance (phase-phase) $R_{20}$ [ohm]	26.5
Winding inductivity (phase-phase) $L_{20}$ [mH]	42.68
Number of pole pairings $N$	15
<b>Specifications for the integrated measuring system</b>	
Typ	1V sin-cos signal (analog), magnetic measuring system with reference track
Spannungsversorgung [VDC]	5 ±10%
Mean current input [mA]	25
Number of poles	160

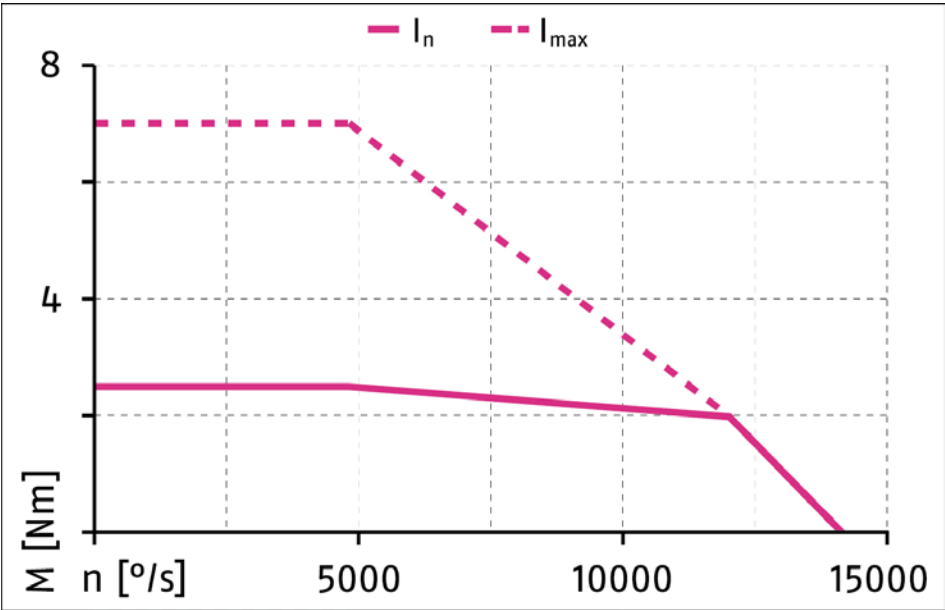
Swiveling time diagram



Swiveling time diagram ERS 135 560V

$t_s$	swing time	$t_p$	pulse off time
-------	------------	-------	----------------

Torque characteristic



Torque characteristic ERS 135 560V

### 12.1.2 Data ERS 170 560V

#### NOTE

The Rotary Module ERS has to be mounted on a thermally well-conducting surface.

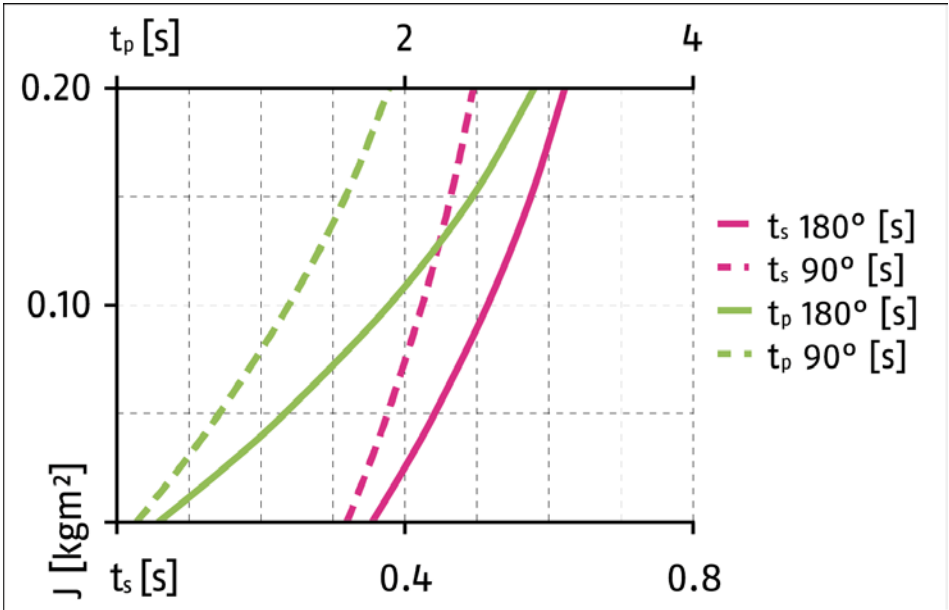
<b>Mechanical operating data</b>	
Heat conduction surface [mm <sup>2</sup> ]	49302
Eigenmasse [kg]	4.7
Maße	170 x 66
Center bore (Ø) [mm]	32
Umgebungstemperatur [°C]	
Min.	+5
Max.	+55
Mass moment of inertia of rotating parts [kgm <sup>2</sup> ]	0.003859
Max. permissible mass moment of inertia [kgm <sup>2</sup> ]	0.20
Rotation range [°]	>360 (turning endlessly)
Repeat accuracy [°]*	0.01
* Distribution of the end positions of 100 successive motions. When approaching from the same direction.	
Measuring system	Incremental
Dichtheit IP	40
Permissible operating mode	S1 - continuous operation**
** Applies only if the preconditions in chapter "Mechanical connection" ( <a href="#">☞ 14.1, Page 59</a> ) are fulfilled. Otherwise, S6 - continuous mode with intermittent load is the permitted operating mode.	
<b>Specifications for the integrated motor</b>	
Motor type	Synchronous
Circuit	Star
Temperature sensor (type)	KTY84-130
Max. permissible operating temperature [°C]	+95
Insulation class	Class F DIN 57530
Output shaft power P <sub>n</sub> [kW]	0.37
Intermediate circuit voltage U <sub>ZK</sub> [V]	560
Rated torque M <sub>n</sub> [Nm]	5.0
Nominal current [A <sub>rms</sub> ]	1.6
Peak current I <sub>max</sub> [A <sub>rms</sub> ]	5.65

## Technical data

Torque constant K [Nm/A <sub>rms</sub> ]	3.1
Rated speed n <sub>n</sub> [rpm]	700
Max. speed n <sub>max</sub> [rpm]	1600
Winding resistance (phase-phase) R20 [ohm]	17.1
Winding inductivity (phase-phase) L20 [mH]	24.9
Number of pole pairings N	15
<b>Specifications for the integrated measuring system</b>	
Typ	1V sin-cos signal (analog), magnetic measuring system with reference track
Spannungsversorgung [VDC]	5 ±10%
Mean current input [mA]	25
Number of poles	216



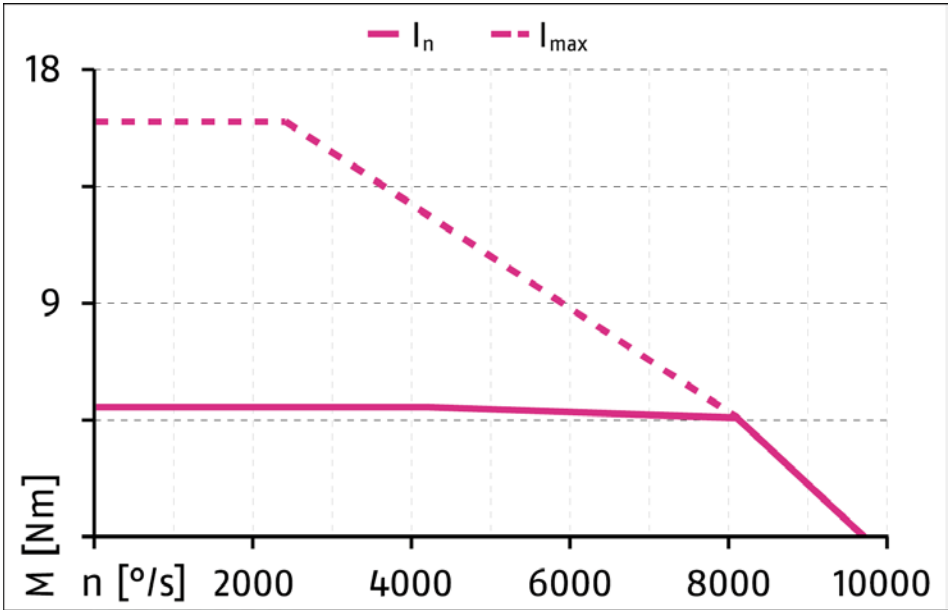
Swiveling time diagram



Swiveling time diagram ERS 170 560V

$t_s$	swing time	$t_p$	pulse off time
-------	------------	-------	----------------

Torque characteristic



Torque characteristic ERS 170 560V

### 12.1.3 Data ERS 210 560V

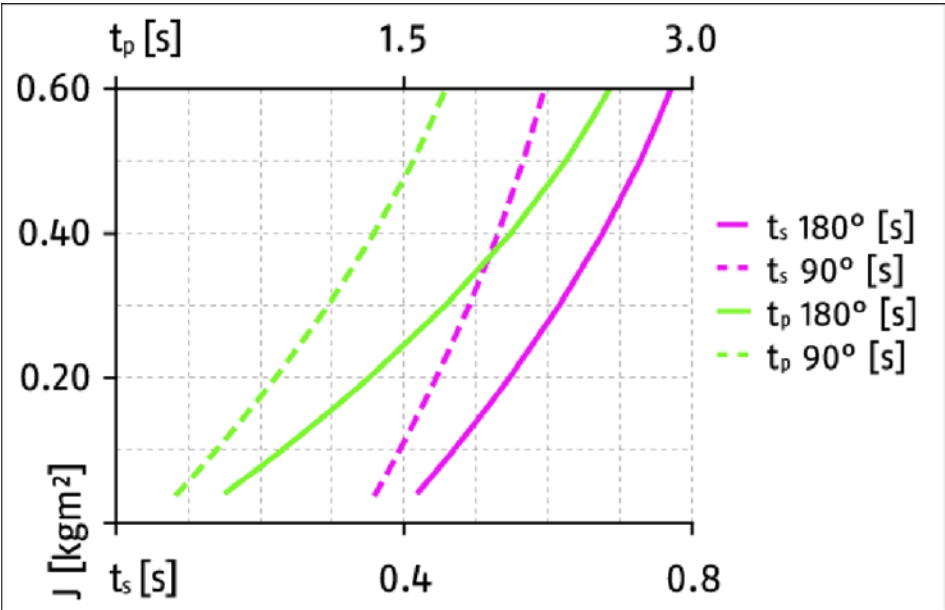
#### NOTE

The Rotary Module ERS has to be mounted on a thermally well-conducting surface.

<b>Mechanical operating data</b>	
Heat conduction surface [mm <sup>2</sup> ]	37363
Eigenmasse [kg]	7.8
Maße	210 x 77
Center bore (Ø) [mm]	40
Umgebungstemperatur [°C]	
Min.	+5
Max.	+55
Mass moment of inertia of rotating parts [kgm <sup>2</sup> ]	0.011278
Max. permissible mass moment of inertia [kgm <sup>2</sup> ]	0.6
Rotation range [°]	>360 (turning endlessly)
Repeat accuracy [°]*	0.01
* Distribution of the end positions of 100 successive motions. When approaching from the same direction.	
Measuring system	Incremental
Dichtheit IP	40
Permissible operating mode	S1 - continuous operation**
** Applies only if the preconditions in chapter "Mechanical connection" ( <a href="#">☞ 14.1, Page 59</a> ) are fulfilled. Otherwise, S6 - continuous mode with intermittent load is the permitted operating mode.	
<b>Specifications for the integrated motor</b>	
Motor type	Synchronous
Circuit	Star
Temperature sensor (type)	KTY84-130
Max. permissible operating temperature [°C]	+95
Insulation class	Class F DIN 57530
Output shaft power P <sub>n</sub> [kW]	0.63
Intermediate circuit voltage U <sub>ZK</sub> [V]	560
Rated torque M <sub>n</sub> [Nm]	10
Nominal current [A <sub>rms</sub> ]	1.68
Peak current I <sub>max</sub> [A <sub>rms</sub> ]	5.67

Torque constant K [Nm/A <sub>rms</sub> ]	5.6
Rated speed n <sub>n</sub> [rpm]	600
Max. speed n <sub>max</sub> [rpm]	1000
Winding resistance (phase-phase) R <sub>20</sub> [ohm]	16.6
Winding inductivity (phase-phase) L <sub>20</sub> [mH]	58.12
Number of pole pairings N	16
<b>Specifications for the integrated measuring system</b>	
Typ	1V sin-cos signal (analog), magnetic measuring system with reference track
Spannungsversorgung [VDC]	5 ±10%
Mean current input [mA]	25
Number of poles	216

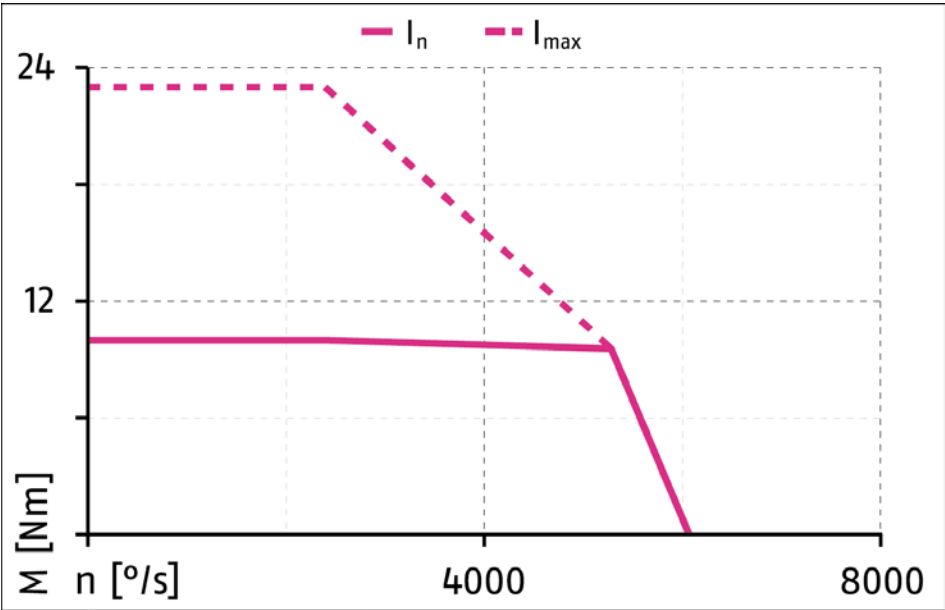
Swiveling time diagram



Swiveling time diagram ERS 210 560V

$t_s$	swing time	$t_p$	pulse off time
-------	------------	-------	----------------

Torque characteristic



Torque characteristic ERS 210 560V

## 12.2 SCHUNK power and sensor cable

Cable type	Power	Transducer
Number of wires/cross-section	4x0.75 mm <sup>2</sup> + 2x0.25 mm <sup>2</sup> + 2x0.25 mm <sup>2</sup>	8x0.25 mm <sup>2</sup>
Max. voltage [V]	600	24
Shielded	Yes	Yes
Shield around individual wire strands	No	Yes
Twisted	No	Yes
Temperature application range [°C]	+5 to +55	+5 to +55
Max. cable length [m]	20	20

### NOTE

Comply with the minimum bending radius, 7.5 times the cable diameter.


## 12.3 Optional holding brake

### Micro valve MV15

Bezugsgröße	RVK 100 135	RVK 100 170	RVK 100 210
Hose connection diameter internal [mm]	4		
Pressure medium	Filtered compressed air, oiled or dry, compressed air purity acc. to ISO 8573-1:2010 [7:4:4]		
Nominal flow rate at 6 bar [l/min]	45		
Operating pressure P [bar]	4.5 - 6		
Power consumption [W]	2.8		
Nennspannung [VDC]	24 (+10% / -5%)		
Brake torque [Nm]	2.5	5.0	10.0
Opening/closing time of the brake at 4.5 bar [ms]			
Opening	100	200	100
Closing	100	200	100

More technical data are included in the catalog data sheet. Whichever is the latest version.

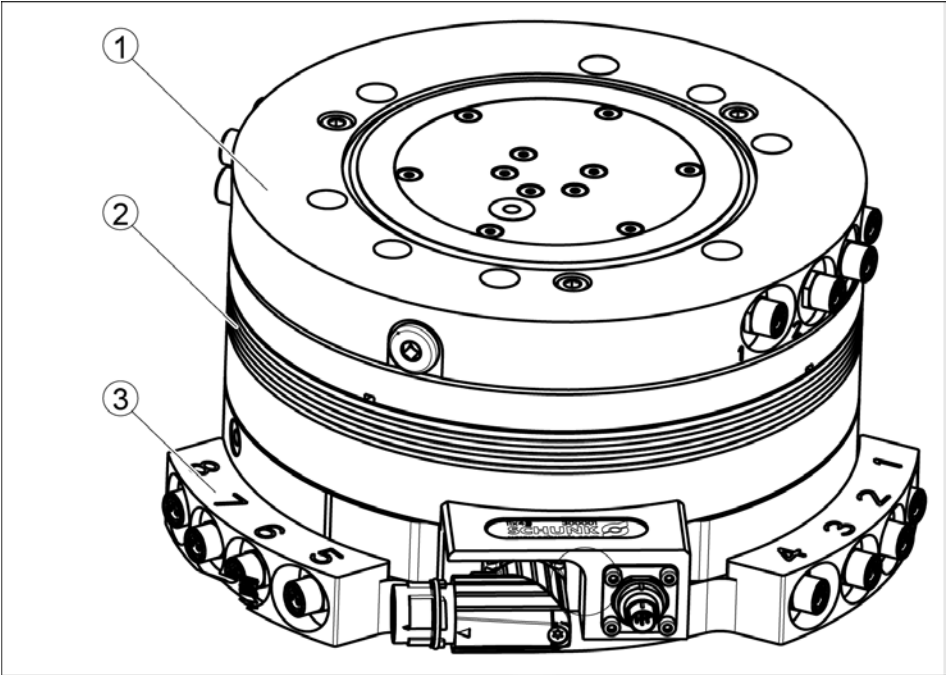
12.4 Pneumatic/electrical feed-through option



**NOTICE**

**Irreparable damage to the DDF due to high RPM!**

- The maximum permitted RPM of the DDF option is 250 RPM.



Design of the DDF variant

1	"Output side" flange
2	Basic module ERS
3	"Input side" connection baseplate

12.5 IP54 version

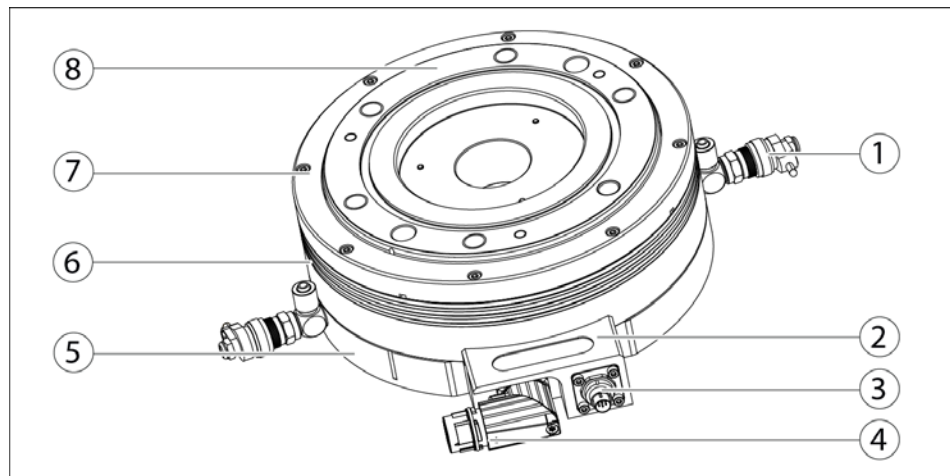
**NOTE**

Due to the installed rotary seal version IP54 has lower technical data as version IP40.

IP rating	1. key number	2. key number
IP 54	Protected against dust in harmful quantity.	Protection against splashing water from all sides.

## 13 Design and description

### 13.1 Design



ERS components

1	Micro valve	5	Basic carrier (fixed)
2	Plug-in connection	6	Bearing flange
3	Plug (sensor cable)	7	Sealing flange
4	Plug (power cable)	8	Rotor (moving)

### 13.2 Description

**Overview** The ERS is a completely mounted, permanently excited synchronous in a cylindrical housing with a center bore.

Der ERS besitzt ein integriertes Positionsmesssystem. In der Motorwicklung ist ein Temperatursensor integriert.

**Torque motor** The ERS belongs to the category of torque motors. The typical characteristics of a torque motor are its high torque, low speeds and a strong rigidity.

**Area of application** The ERS is used typically for rotating and pivoting of large masses. The center bore can be used as a media feed-through.

**Operating modes** The ERS must be operated using a controller. The following operating modes may be selected.

- power-controlled
- speed-controlled
- position-controlled

ERS circuit diagram



### 13.5 Type key and name plate

Order designation		ERS	xxx	-	xxx	-	xx	-	x	-	x	-	x
Size	ERS 210 = d 210mm ERS 170 = d 170mm ERS 135 = d 135mm												
Voltage	560 = 560 V rated motor voltage												
IP tightness	40 = IP 40												
Brake	N = without brake B = with brake												
Rotary feed-through	N = without rotary feed-through D = with rotary feed-through												
Encoder system	h = incremental												


Type key and name plate

The nameplate is attached to one of the broad sides of the module.

Specifications on the name plate (example ERS 210 560V)

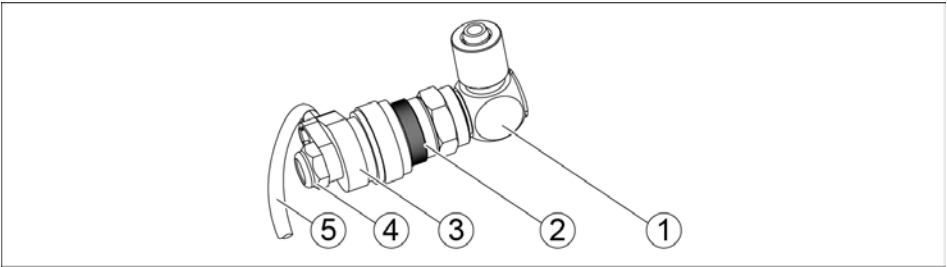
Bezeichnung	Specification
Manufacturer	Schunk GmbH & Co. KG
Type / model - protection class	ERS210-560-40-B-N-I
ID	0310xxx
Rated torque ( $M_N$ )	10 Nm
Voltage ( $U_N$ )	560 V
Current ( $I_N$ )	1.8 A

13.6 Optional holding brake



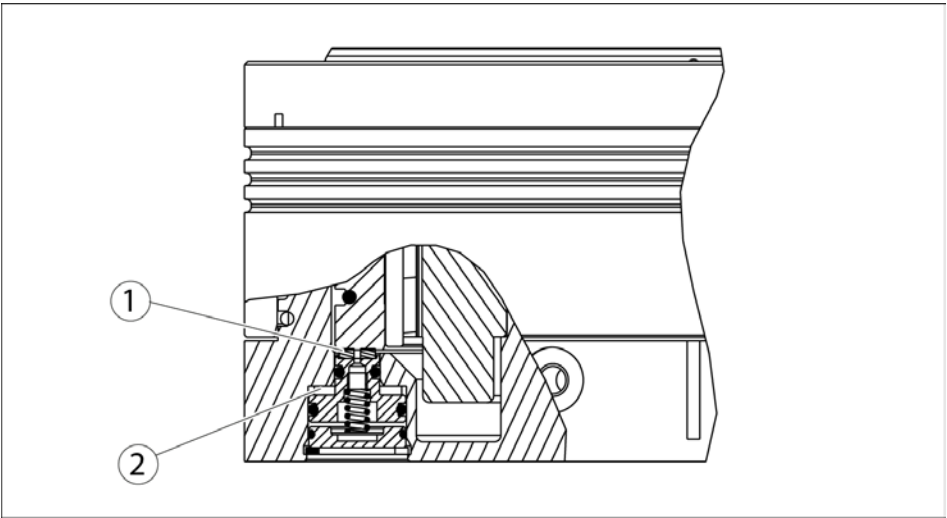
**NOTICE**

**This is a holding brake and not a service brake!**



Micro valve MV15

1	Swivel fitting	3	Valve cover
2	Cartridge	4	Sound absorber
5	Connection cable		



Brake option

1	Contact surface between brake pad and rotor
2	Pre-loaded brake piston with brake pad



**NOTE**


The micro valve is closed if there is no voltage at the micro valve. In this state, the holding brake is active.

The micro valve is opened if there is voltage at the micro valve. In this state, the holding brake is inactive.

## 14 Assembly

### 14.1 Mechanical connection

	 <b>WARNING</b>
	<p><b>Risk of injury when the machine/system moves unexpectedly!</b></p> <ul style="list-style-type: none"> <li>• Remove the energy supplies.</li> <li>• Make sure, that no residual energy remains in the system.</li> </ul>

	<b>NOTICE</b>
	<p><b>Malfunction due to mechanical stress in the housing possible!</b></p> <ul style="list-style-type: none"> <li>• Observe the requirements for the evenness of the mounting surface.</li> </ul>

**Check the evenness of the bolting surface** The values relate to the entire bolting surface.

Requirements for levelness of the bolting surface (Dimensions in mm)

Diameter	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

**Prerequisites** Depending on the load, it is necessary to make sure that the resulting power losses are dissipated.

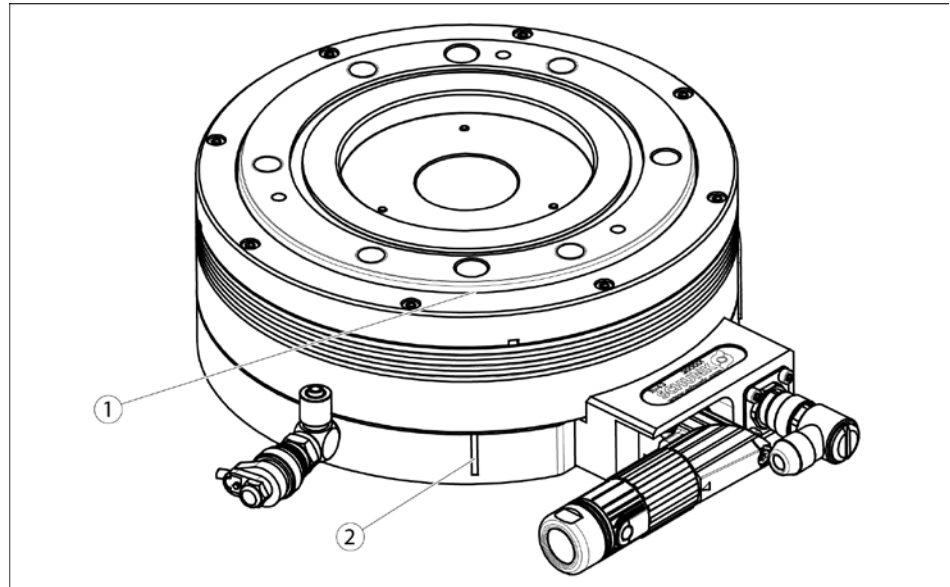
- The ERS must be mounted on a surface with good thermal conductive properties.

To achieve the IP protection class 40:

- Design the connection structure so that no chips, cooling water or dirt can enter the ERM's connection area from the working area.

## NOTE

Note the position of the reference mark during installation.



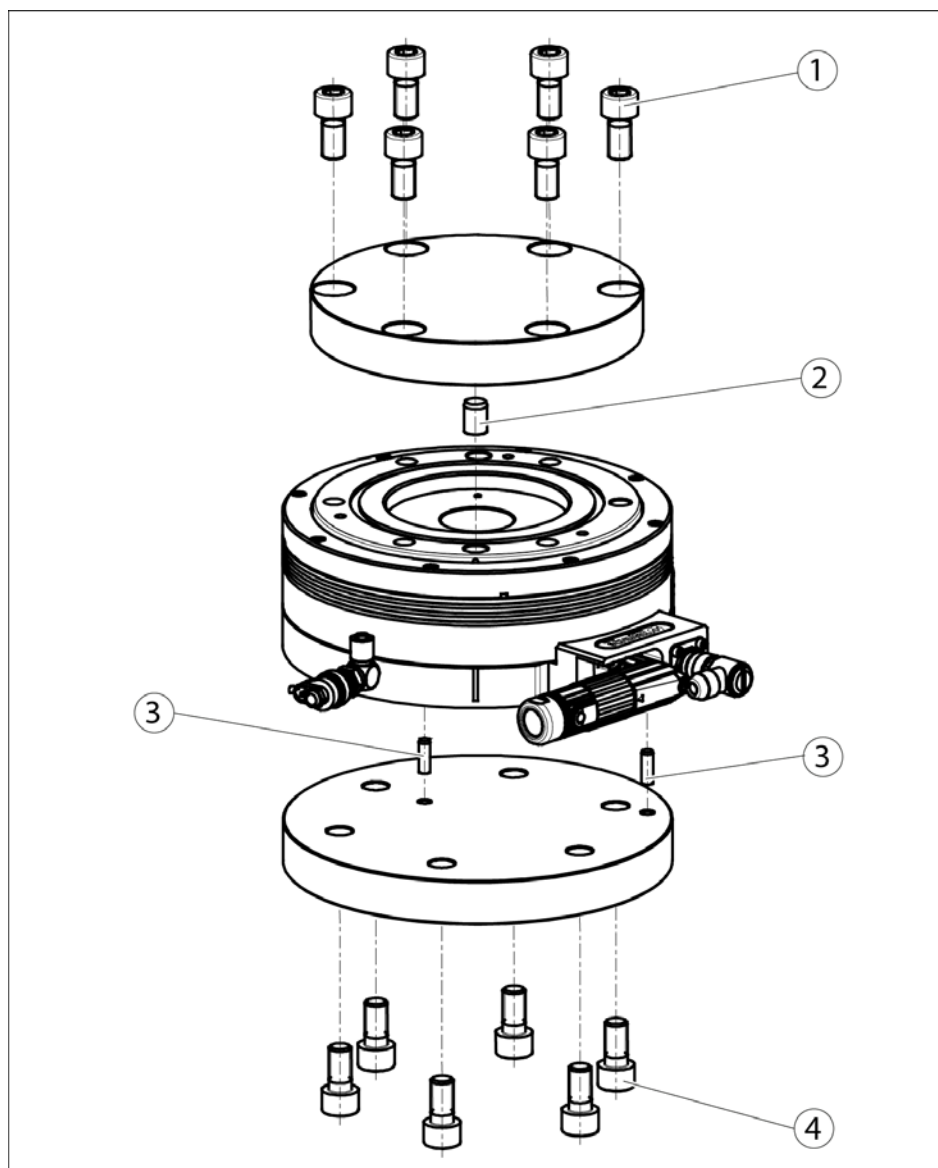
Position of the reference marks

1	Indexing pulse	2	Encoder sensor
---	----------------	---	----------------

- Assembly**
- 1 Make sure that the interfaces to attachments are clean and undamaged.
  - 2 Mount the rotary module on the machine via the corresponding interface. Six fastening screws are required for each fastening side.

## NOTE

All dimensions of the drawings can be taken from our website at [www.schunk.com](http://www.schunk.com) under "CAD data service".





View of the assembly of the adapter plates on rotor and basic carrier

Pos.	Beschreibung	RVK 100 135	RVK 100 170	RVK 100 210
1	Mounting screws	M8	M10	M10
2	Centering pin	D8/H7	D10/H7	D10/H7
3	Centering pins	D5/H7	D5/H7	D5/H7
4	Mounting screws	M8	M10	M12

Tightening torques for screws

Screws	M8	M10	M12
Tightening torques	24 Nm	48 Nm	84 Nm

## 14.2 Electrical connection

	 <b>DANGER</b>
	<p><b>Risk of fatal injuries due to electric shock!</b></p> <ul style="list-style-type: none"> <li>• Switch off power supply before assembly, setting and maintenance and make sure that it cannot be accidentally switched back on again.</li> <li>• Arbeiten an elektrischen Anlagen nur von Elektrofachkräften durchführen lassen.</li> <li>• Disconnect the controller from the power supply. The intermediate circuit capacitors must be discharged (wait about 5 minutes until the capacitors have discharged).</li> <li>• Observe the sequence when connecting the cables (grounding cable first, then conductors).</li> </ul>

### NOTE

Cables are electronic components which can react sensitively to high-frequency interference or electromagnetic fields.

- Check that the cable is correctly connected and installed.
- There must be a sufficient distance between sources of interference and their supply cable.

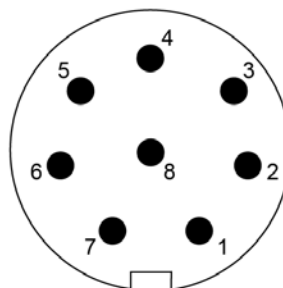
Preconditions for installing the connection cables:

- The cables are without tensile and torsion loads. Use cable guide chains.
- The minimum bending radius (7.5 times the cable diameter) is complied with, ([🔗 12.2, Page 53](#)).
- The motor's range of rotation and function are not impaired.

### NOTE

For more information about the converter parameters, refer to the user manual for the converter.

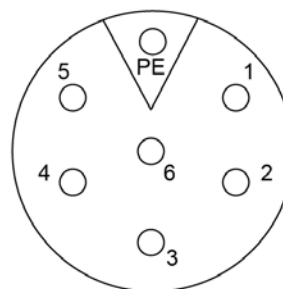
## Sensor plug connection assignment



Sensor plug

Pin	Signal	Pin	Signal
1	A (SIN +)	5	Z (Ref +)
2	/A (SIN -)	6	/Z (Ref -)
3	B (COS +)	7	GND
4	/B (COS -)	8	Vcc

## Connection pin assignment power plug



power plug

Pin	Signal	Pin	Signal
PE	ground/Mengine case	4	N. C.
1	U	5	Temperature sensor 1
2	V	6	Temperature sensor 2
3	W		

The ERS is supplied with prefabricated cables in lengths of 5 to 20 m which have to be ordered separately (red power cable, white sensor cable, Y-cable), ([5, Page 24](#)).

**The ERS must be connected to a converter.**

The cable colors and designations in the following tables apply to the SCHUNK connection cable.

**Observe the cable assignment.**

Connection assignment of the red power cable

Funktion	Signal	Cable designation
Power	U	Black A1 (U)
	V	Black A2 (V)
	W	Black A3 (W)
	PE	Green/Yellow
Temperature sensor	T1	Red
	T2	Blue

Connection assignment of the white signal cable for Bosch IndraDrive Basic/Advanced

Funktion	Signal	Pin assignment – 15-pin Sub-D socket
Encoder	/Z (Ref -)	Pin 3
	Z (Ref +)	Pin 4
	/B (COS -)	Pin 5
	B (COS +)	Pin 6
	A (SIN +)	Pin 7
	/A (SIN -)	Pin 8
	GND	Pin 10
	Vcc	Pin 12

Connection assignment of the white signal cable for Bosch IndraDrive CS

Funktion	Signal	Pin assignment – 15-pin Sub-D socket
Encoder	A (SIN +)	Pin 2
	/A (SIN -)	Pin 3
	GND	Pin 4
	B (COS +)	Pin 5
	/B (COS -)	Pin 6
	Z (Ref +)	Pin 9
	/Z (Ref -)	Pin 10
	Vcc	Pin 12




Connection assignment of the white signal cable for Siemens Sinamics


<b>Funktion</b>	<b>Signal</b>	<b>Pin assignment – 15-pin Sub-D socket</b>
Encoder	/B (COS -)	Pin 1
	Vcc	Pin 2
	Z (Ref +)	Pin 3
	/Z (Ref -)	Pin 4
	A (SIN +)	Pin 5
	/A (SIN -)	Pin 6
	B (COS +)	Pin 8
	GND	Pin 10

Connection assignment of the power cable for Sinamics (connection to converter)

<b>Funktion</b>	<b>Signal</b>	<b>Pin allocation – Siemens circular plug</b>
Power	U	U2
	V	V2
	W	W2
	PE	Earth


14.3 Optional holding brake




 **WARNING**

**Risk of injury due to unexpected movement of the machine/automated system!**

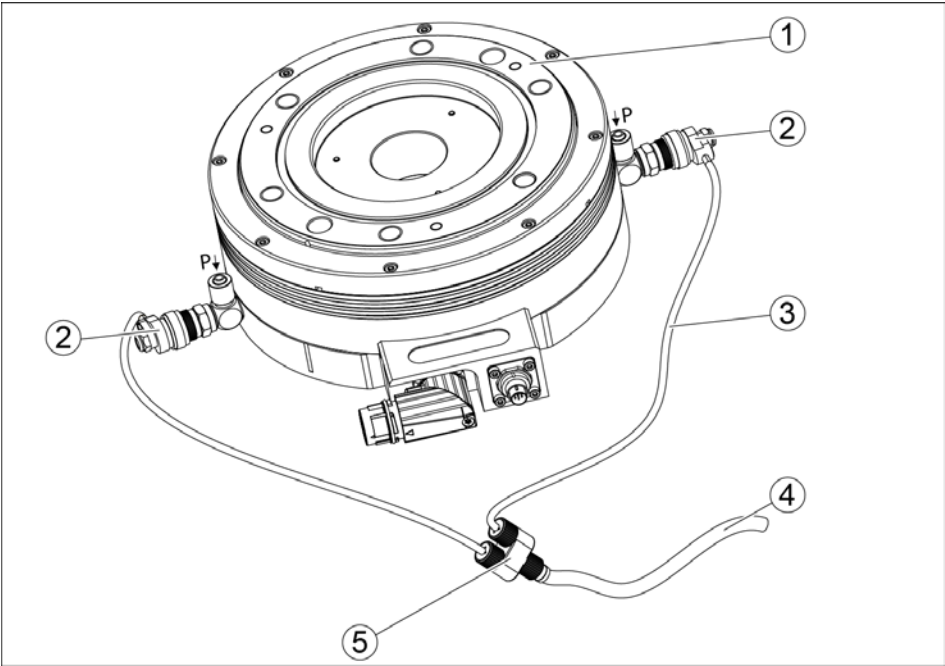
- The holding brake is not a service brake.
- The holding brake is not allowed to be used as a safety component.
- The holding brake only applies rated torque, and is used for holding position at standstill.



 **WARNING**

**Risk of injury when working on the micro valve!**

- Switch off the energy supply.
- Switch off the compressed air supply.




Rotary module with micro valve

1	Rotary module	4	Y distributor
2	Micro valve	5	Cable extension
3	Connection cable		

Comply with the following procedure when mounting the micro valve:

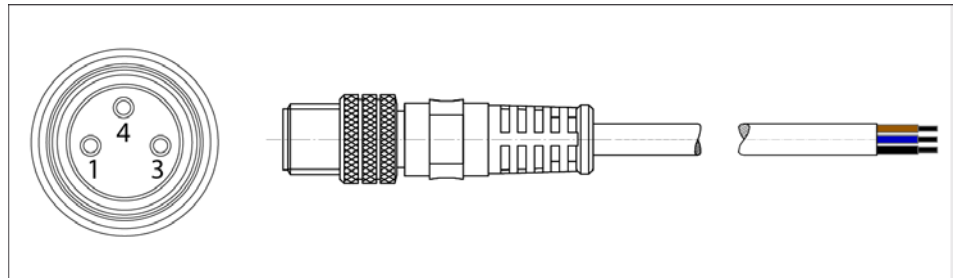
- If the micro valve is supplied as a complete component, dismantle the micro valve into its individual components and then install the individual components:
  - Dismantling the micro valve into its individual components, ([🔗 14.3.2, Page 68](#)).
  - Installing the individual components, ([🔗 14.3.3, Page 69](#)).
- If the micro valve is supplied in individual components, install the individual components, ([🔗 14.3.3, Page 69](#)).

### 14.3.1 Electrical connection

	<p><b>NOTICE</b></p> <p><b>Damage to the cable is possible.</b> The bending radius of the cable is not allowed to be less than the minimum amount:</p> <ul style="list-style-type: none"> <li>• <b>Static:</b> 10 times the cable diameter.</li> <li>• <b>Dynamic:</b> 15 times the cable diameter, suitable for cable tracks.</li> </ul>
---	---

#### NOTE

Route and secure the connection cable so there are no tensile and twisting forces on the valve cover. Tensile and twisting forces can cause the screw cap to come loose and lead to contact problems.



PIN allocation M8 plug and cable color table extension

PIN	Cable color	Assignment
1	Brown	n.c.
3	Blue	GND
4	Black	Control voltage, +24 VDC

#### Screw cap with LED:

If the connection cable of the micro valve has been connected correctly to the electrical power supply, the LED in the screw cap will light up when the 24 VDC voltage is applied.

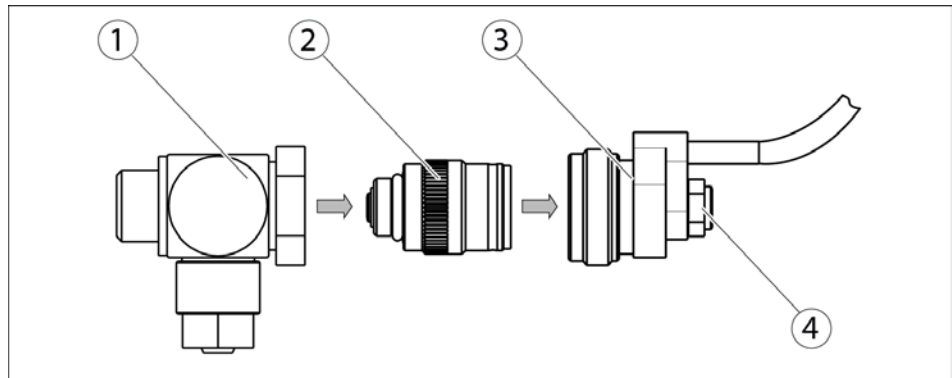
#### 14.3.1.1 Connection to Siemens Safe Brake Relay

Terminal	Cable color	Assignment
BR+	Black	+24 VDC
BR-	Blue	GND

#### 14.3.1.2 Connection to Bosch Rexroth IndraDrive

Terminal	Cable color	Assignment
X6-3	Black	+24 VDC
X6-4	Blue	GND

#### 14.3.2 Dismantling micro valve



Dismantling micro valve

- 1 Undo the knurled screw on the valve cover (3).

#### NOTE

In valves with fixed covers, the valve cover with connection cable cannot be removed.

- 2 Remove the valve cover (3) with connection cable and sound absorber (4).
- 3 Unscrew the valve cartridge (2) from the swivel fitting (1).

### 14.3.3 Installing and connecting the micro valve



#### WARNING

##### Risk of injury when working on the micro valve!

- Switch off the energy supply.
- Switch off the compressed air supply.

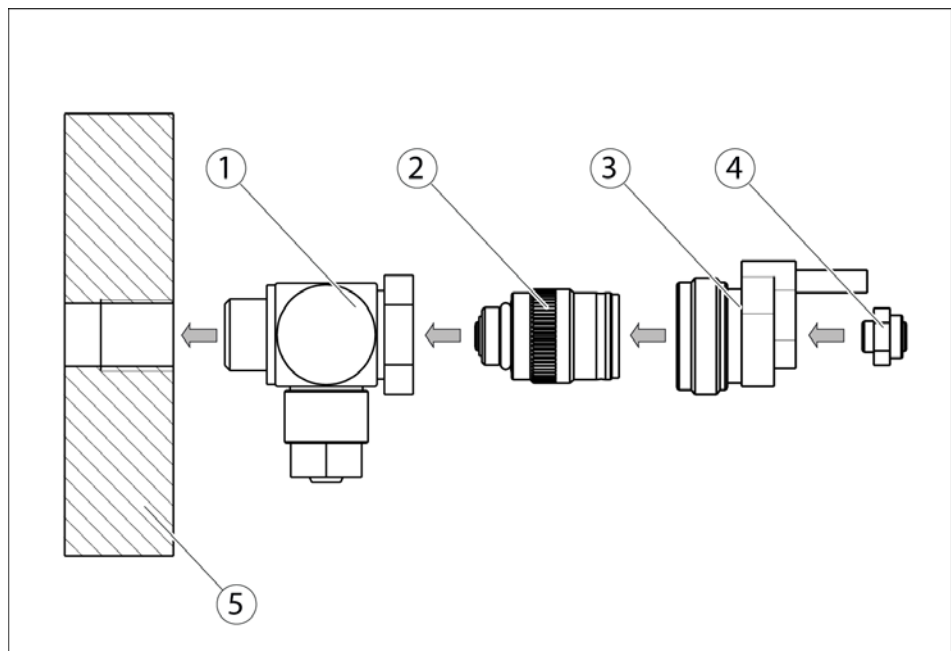


#### NOTICE

##### Damage to valve cartridges, valve cover and accessories!

Valve cartridge, valve cover and accessories can be damaged by using tools.

- Only install or remove the valve cartridge, valve cover and accessories by hand.



Micro valve

#### NOTE

Always install the micro valves in the following sequence, for example to avoid unscrewing the screw cap from the valve cartridge if an accessory is fitted subsequently.

- 1 Screw the hollow screw of the swivel fitting (1) **lightly** into the pneumatic unit (5), **without tightening**.
- 2 Turn the swivel fitting (1) to the desired position and hold it firmly.

- 3 Tighten the hollow screw of the swivel fitting (1) in this position  
**Maximum torque 1.5 Nm.**
- 4 Screw the valve cartridge (2) into the swivel fitting (1) as far as possible  
**Maximum torque 3 Nm.**
- 5 Screw the sound absorber (4) into the valve cover (3)  
**Maximum torque 3 Nm.**
- 6 Put the valve cover (3) on the cartridge (2) with the connection cable in the required position.
- 7 Push the valve cover (3) onto the cartridge (2) and screw tight with the knurled nut onto the cartridge (2)  
**Maximum torque 3 Nm.**
- 8 Connect the pneumatic hose to the pneumatic connection of the swivel fitting (1).
- 9 Push the Y-distributor onto the M8 plug of the connection cable and screw tight.
- 10 Push the cable extension onto the Y-distributor and screw tight.
- 11 Connect the cable extension to the electrical power supply, [\(☞ 14.3.1, Page 67\)](#).
- 12 Route the connection cable and cable extension and secure.

### 14.3.4 Realigning the connection cable

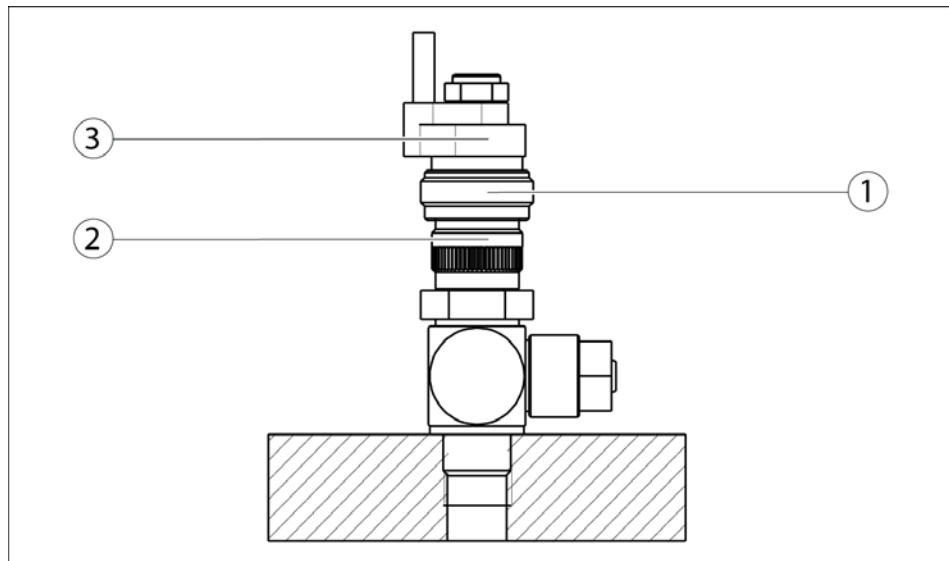


#### NOTICE

##### Risk of damage to the contacts!

The contacts can be damaged if the valve cover is screwed on firmly and the alignment of the connection cable changed.

- Define the position of the connection cable when the valve cover is put on.









Valve cover

Carry out the following steps if the position of the connection cable should be changed:

- 1 Unscrew the knurled nut (1) of the valve cover (3) from the valve cartridge (2).
- 2 Remove the valve cover (3) from the valve cartridge (2).
- 3 Put on the valve cover (3) again with the connection cable in the required alignment and hold it in position.
- 4 Tighten the valve cover (3) on the valve cartridge (2) with the knurled nut (1).

## 15 Start-up

	<p><b>NOTICE</b></p> <p><b>Malfunction in the event of an overload!</b></p> <ul style="list-style-type: none"> <li>• Avoid impact loads.</li> <li>• Do not exceed the bearing load limits.</li> </ul>
	<p><b>NOTICE</b></p> <p><b>Malfunction in the event of overheating!</b></p> <ul style="list-style-type: none"> <li>• Observe the motor's technical data.  <a href="#">(→ 12, Page 44).</a></li> </ul>
	<p> <b>WARNING</b></p> <p><b>Risk of injury and material damage when the machine/system moves unexpectedly!</b></p> <ul style="list-style-type: none"> <li>• Only allow configuration work to be carried out by authorized specialist personnel.</li> <li>• Observe the information in the operating manual for the controller.</li> </ul>
	<p> <b>WARNING</b></p> <p><b>Collisions in setup mode when the machine/system moves unexpectedly!</b></p> <p>The motor can run away.</p> <ul style="list-style-type: none"> <li>• Keep the motor's moving range (360°) free.</li> </ul>



## 15.1 Start-up of the Bosch Rexroth IndraDrive C/CS

### NOTE

The brief instruction in this chapter is solely relevant for the simple start-up of the rotary module ERS with Bosch Rexroth IndraDrive. The user manual of the converter takes precedence.

The following description applies to firmware version MPH-05V12-D5.

### Connection of the converter to the ERS

#### ✓ Read through the user manual of the converter before starting up the converter.

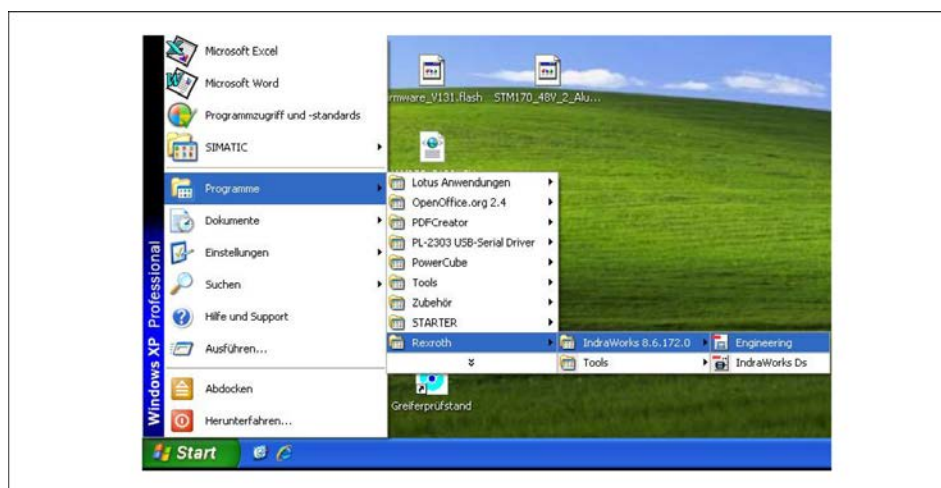
- 1 Connect the converter to the three-phase system.
- 2 Connect the red power cable and the white sensor cable to the ERS.
- 3 Connect the 15-pin D-Sub plug of the sensor cable to the converter.
- 4 Connect the open ends of the power cable (U, V, W and Earth) to the converter.

### Setting up the converter

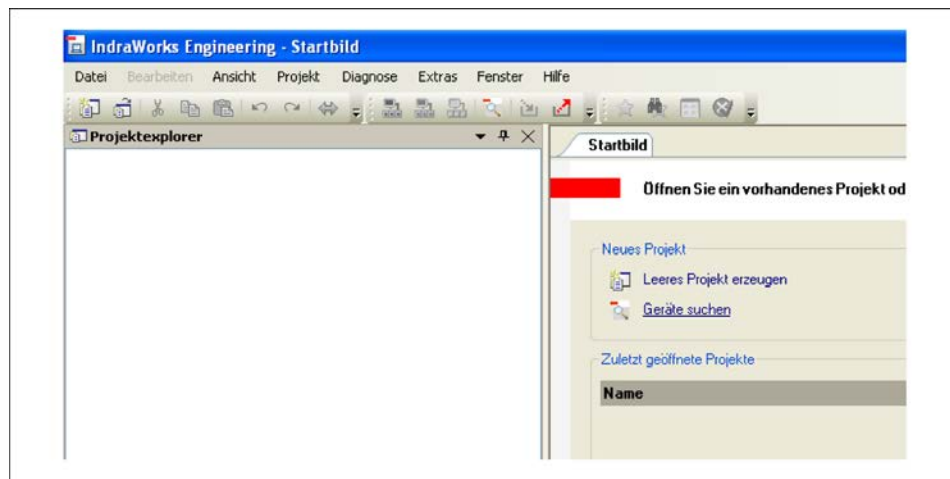
### NOTE

Select the corresponding interface for start-up via Ethernet. The procedure is the same.

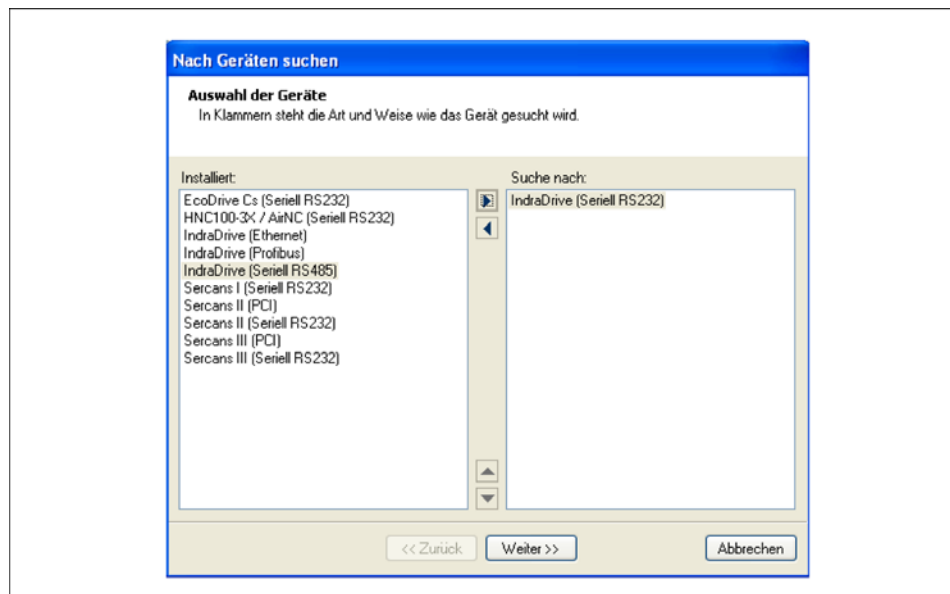
- 1 Connect the RS232 interface of the computer to the serial interface of the converter using the serial cable.
- 2 Switch on the converter and power unit.



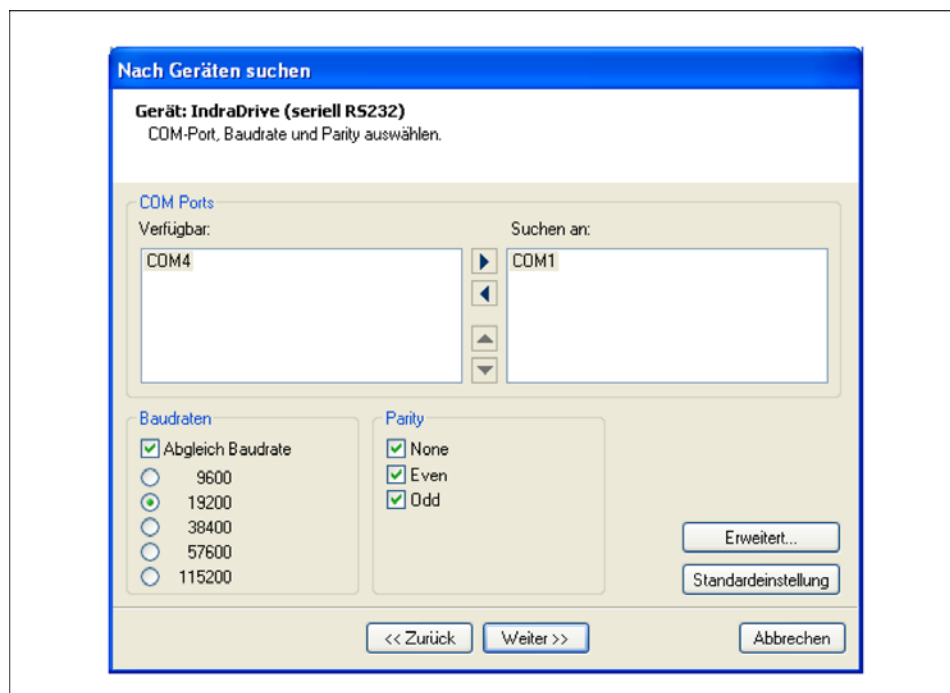
- 3 Start IndraWorks on the PC.



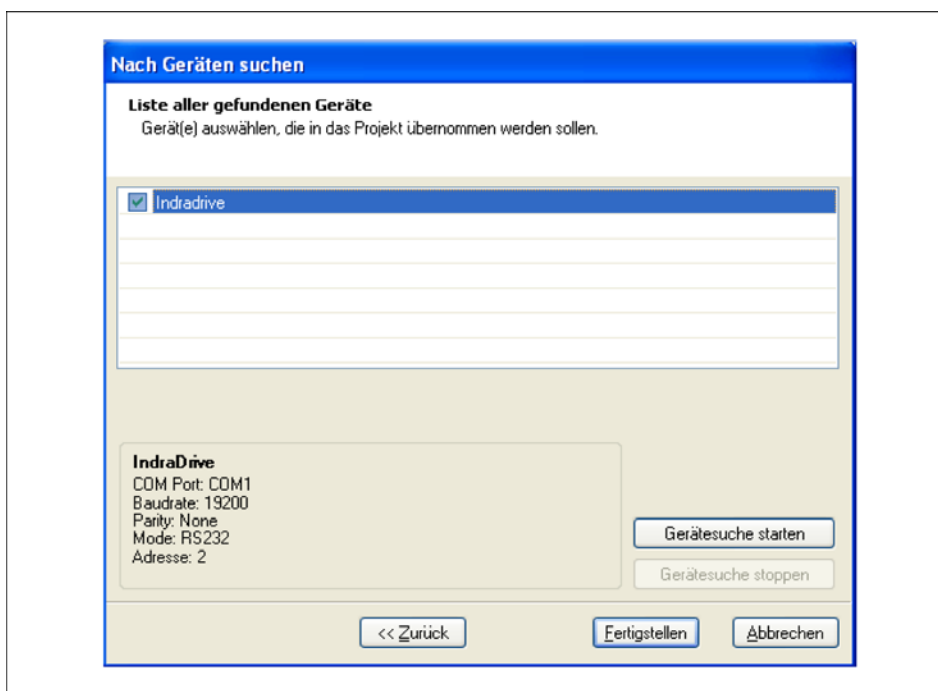
## 4 Search for a new device.



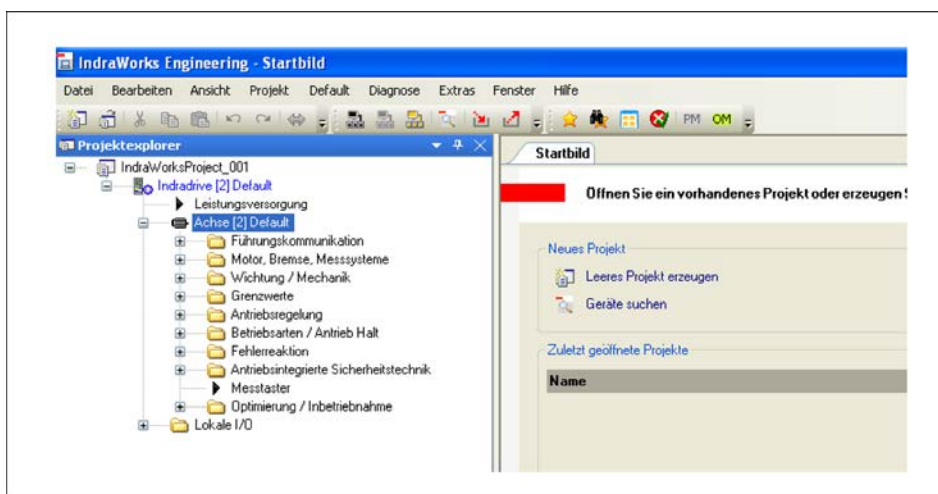
## 5 Select the interface on the converter.



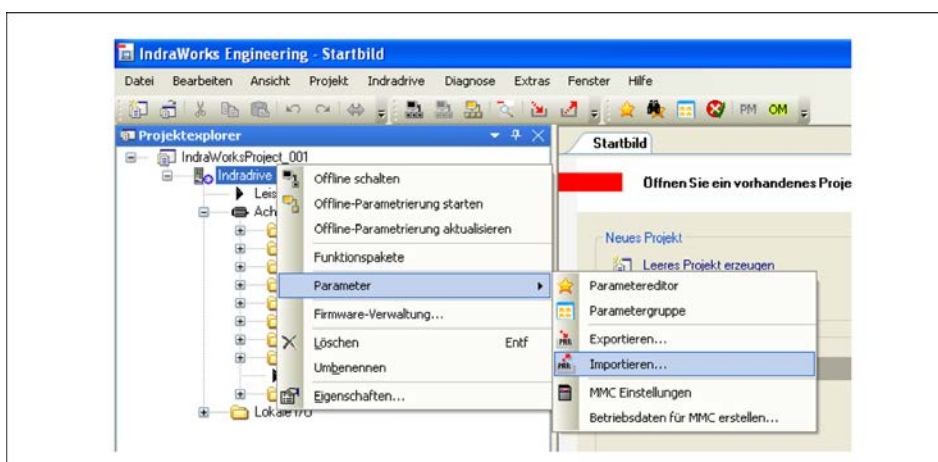
## 6 Select the interface on the computer.



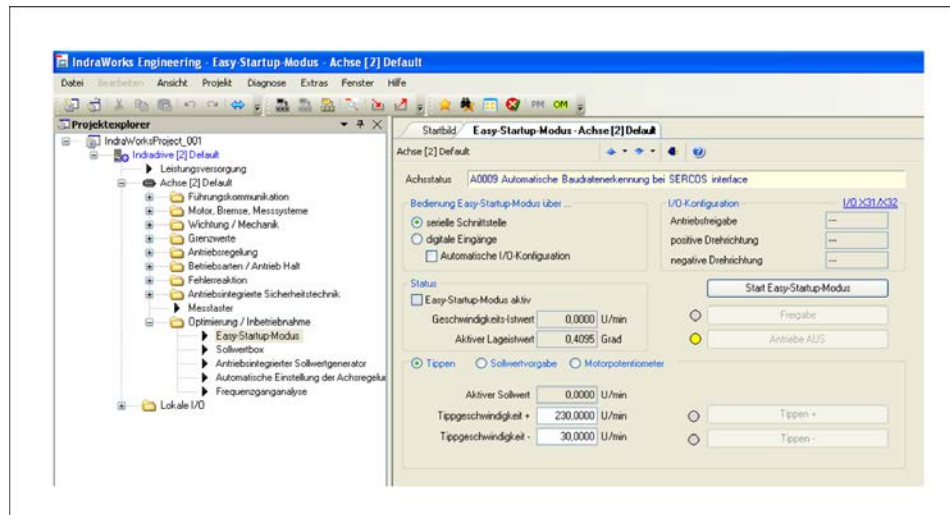
## 7 When the desired device has been found, click on "Finish".



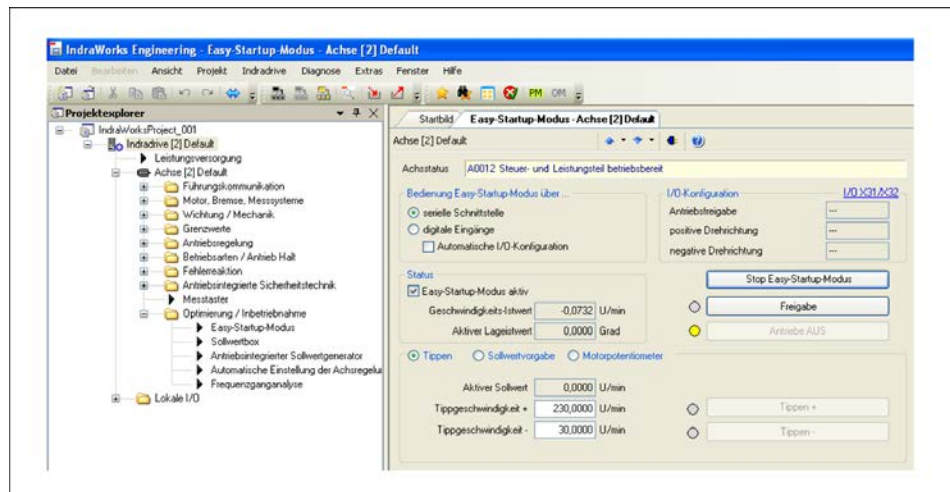
⇒ A new project is created automatically in the project explorer.



## 8 Import the parameter file supplied on the SCHUNK CD.



## 9 Open and start the Easy Start Up mode.



## 10 Enable the drive (ERS) (this is only possible when the power unit is switched on).



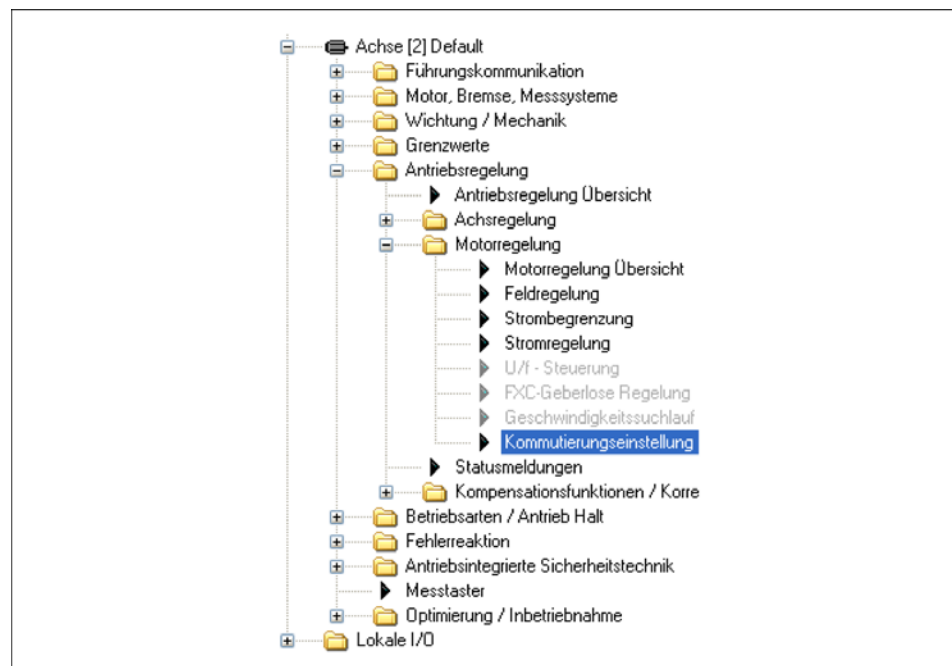
- 11 Read the warning attentively and acknowledge it by clicking "OK".

#### NOTE

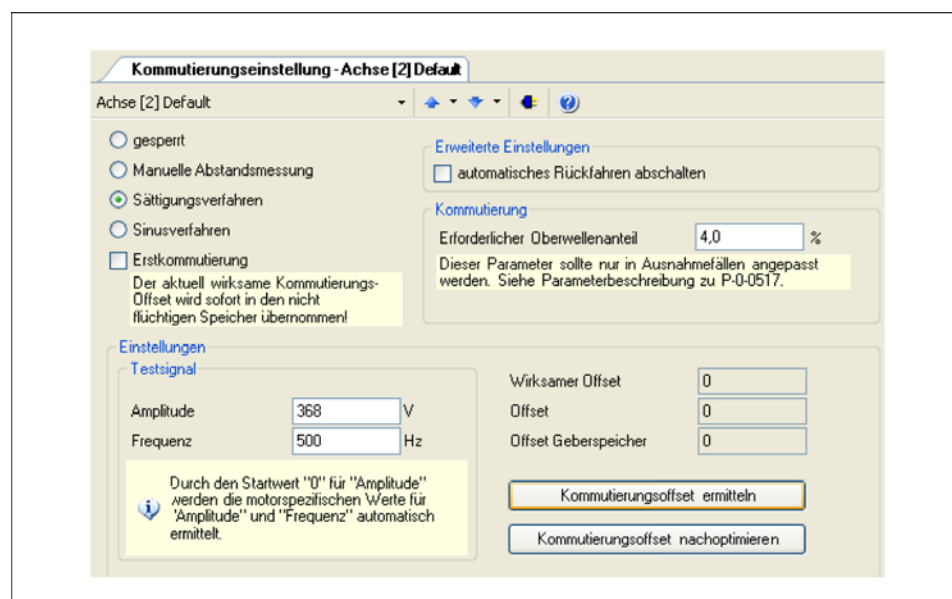
In the case of the Bosch Rexroth IndraDrive C/CS converter, it can occur that the commutation current is too low or too high following the enable.

If one of these errors occurs:

- delete error.



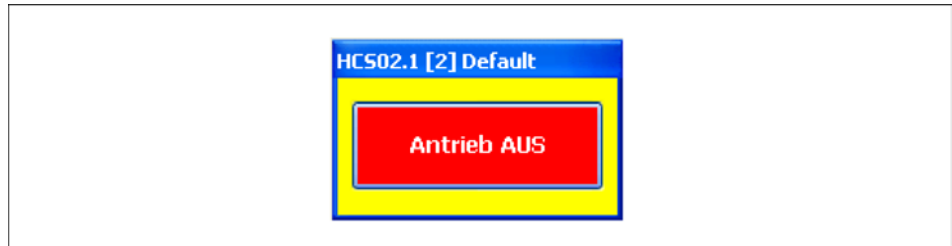
- 12 Then go to the following location: "Drive control" → "Motor control" → "Commutation settings".



- 13 Establish the new commutation offset.

### NOTE

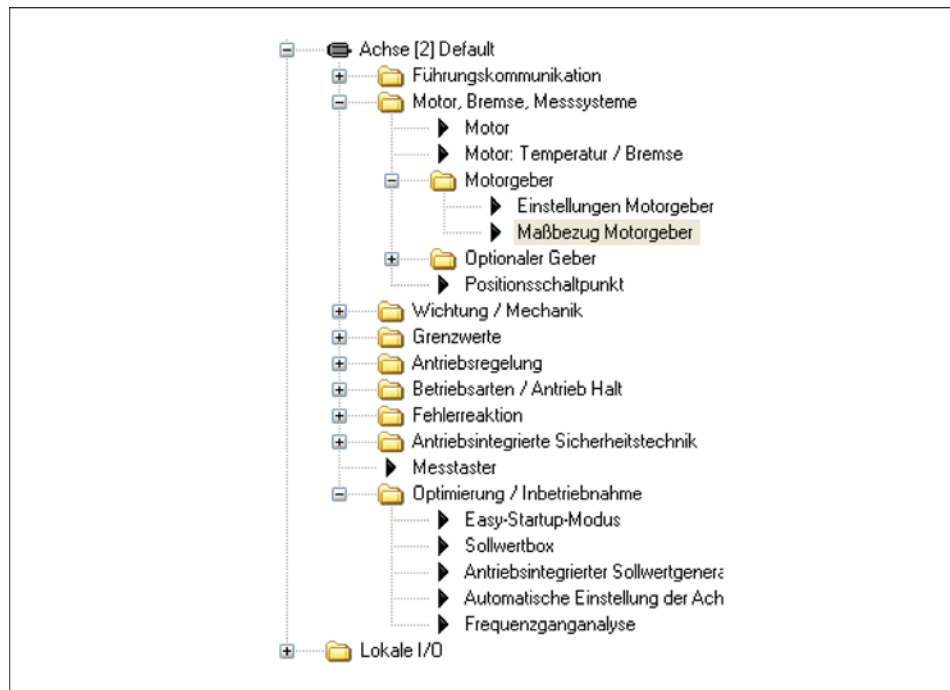
When the drive is enabled, a field appears in the foreground of the screen that can be used to switch off the drive (ERS) in an emergency:



14 Choose between the various options:

- ⇒ Referencing
- ⇒ Velocity run
- ⇒ Positioning run

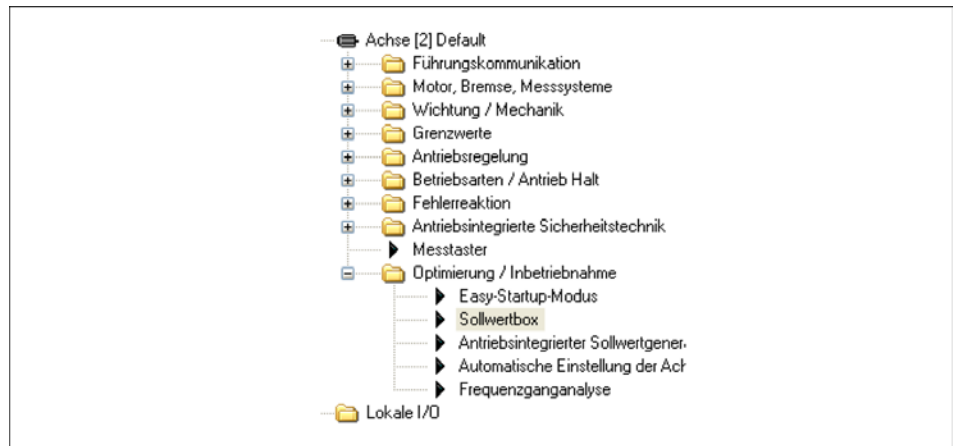
## Referencing



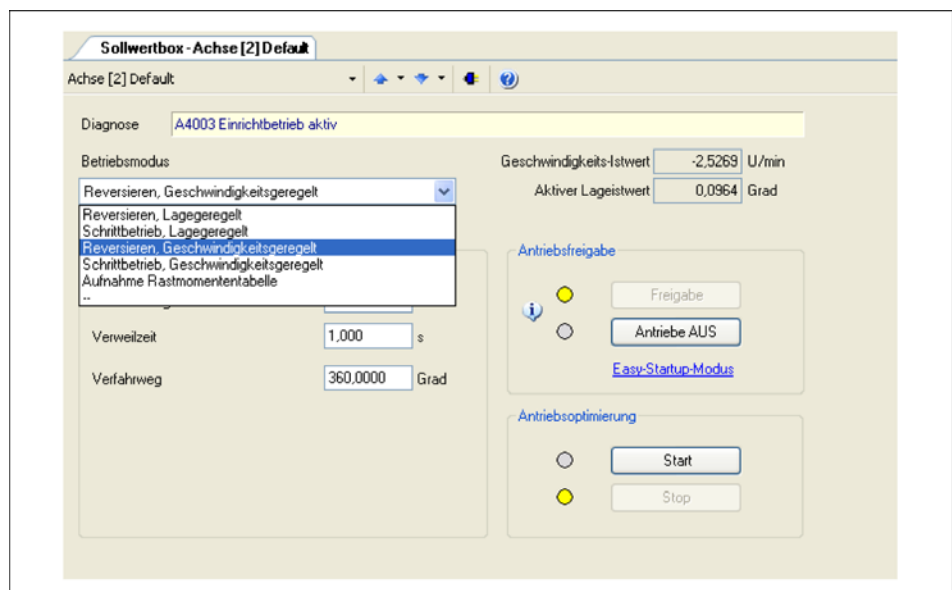
- 1 Go to the following location: "Motor" → "Motor encoder" → "Motor encoder dimensional reference".

- 2 Select the referencing type. Select the "Drive-guided referencing" field to start the reference movement.

## Velocity run



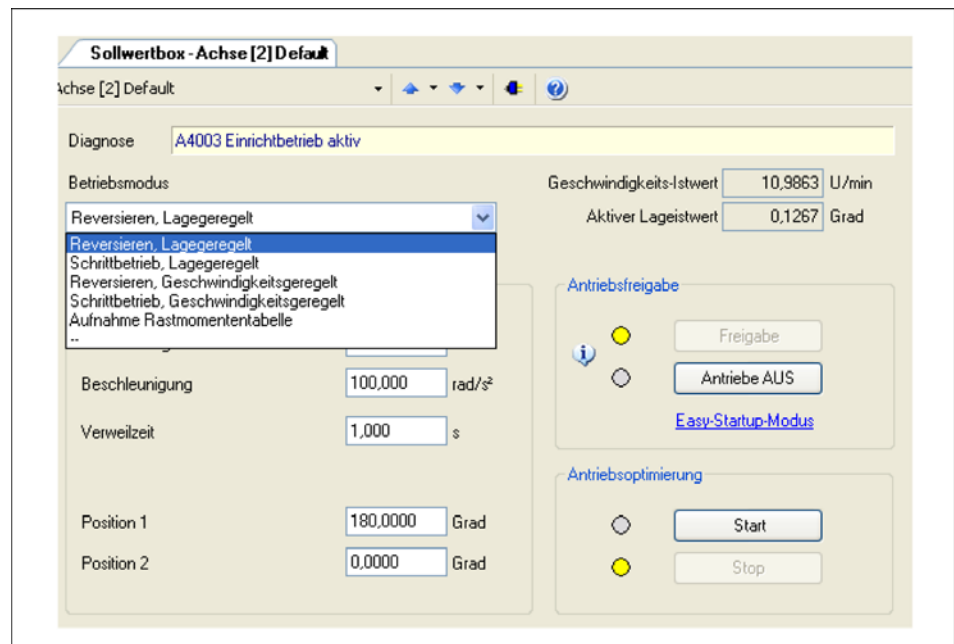
- 1 Select the "Reference value box" under the "Optimization/Start-up" folder.



- 2 Select the velocity movement type under "Operating mode". To start the movement, click on "Start".



## Positioning run



- 1 Select a "position-controlled" positioning movement under "Operating mode".

**NOTE**

With respect to the use of other functions:

Bosch Rexroth IndraDrive C user manual or support from Bosch Rexroth.

## 15.2 Start-up of the Siemens Sinamics S120 CU310/CU320

### NOTE

The brief instruction in this chapter is solely relevant for the simple start-up of the ERS with Siemens Sinamics S120 CU310/CU320. The user manual of the converter takes precedence.



### NOTICE

**Failure of or irreparable damage to the drive if the following parameters are not configured correctly!**

- **p 340** Automatic calculation of motor/control parameters – [3]
- **p 383** Motor limit current  
ERS135: 3.8A  
ERS170: 5.98A  
ERS210: 5.7A
- **p604** Motor overtemperature warning threshold – 95°C
- **p605** Motor overtemperature fault threshold – 105°C
- **p606** Motor overtemperature time stage – 0.1s
- **p611** I2T time constant thermal – 30s
- **p612** Thermal motor model configuration – 1H
- **p615** I2T motor model fault threshold – 90°C
- **p616** Motor overtemperature warning threshold 1 – 100°C

### NOTE

- Only the values of the following parameter files are allowed to be used for start-up of the individual sizes:  
Without DDF:
  - **ERS135:** 5522559\_ERS135\_CU310\_320\_FW4
  - **ERS170:** 5522560\_ERS170\_CU310\_320\_FW4
  - **ERS210:** 5522561\_ERS210\_CU310\_320\_FW4
 With DDF:
  - **ERS170:** 5523138\_ERS170\_DDF\_CU3xx\_FW4
  - **ERS210:** 5523139\_ERS210\_DDF\_CU3xx\_FW4
- The parameters can either be loaded into the inverter as described in this chapter or entered manually using the start-up wizard.

**NOTICE**

**If different parameters are used or the parameters are calculated automatically, the drive could suffer irreparable damage!**

- With manual input, it is necessary to make sure that only the values from the parameter files specified above are used.

The following description applies to the drive ES - starter version V4.2.0.1.

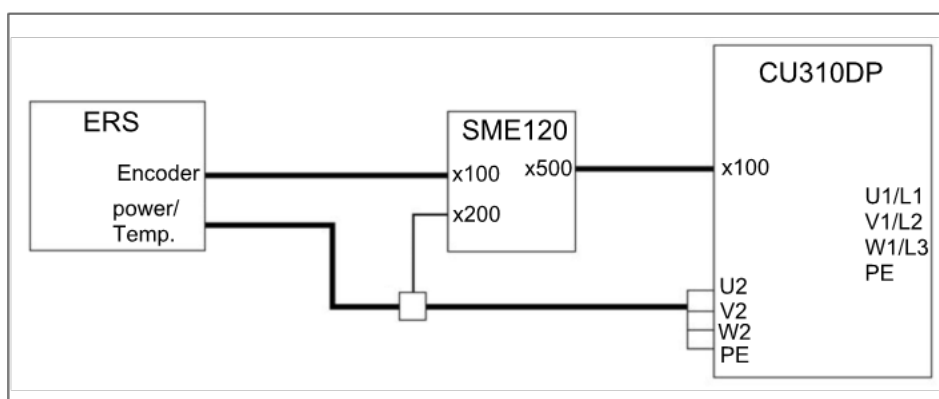
**NOTE**

With the Siemens Sinamics, it is possible to change the voltage supply on the encoder interface from 5 V to 24 V using a parameter.

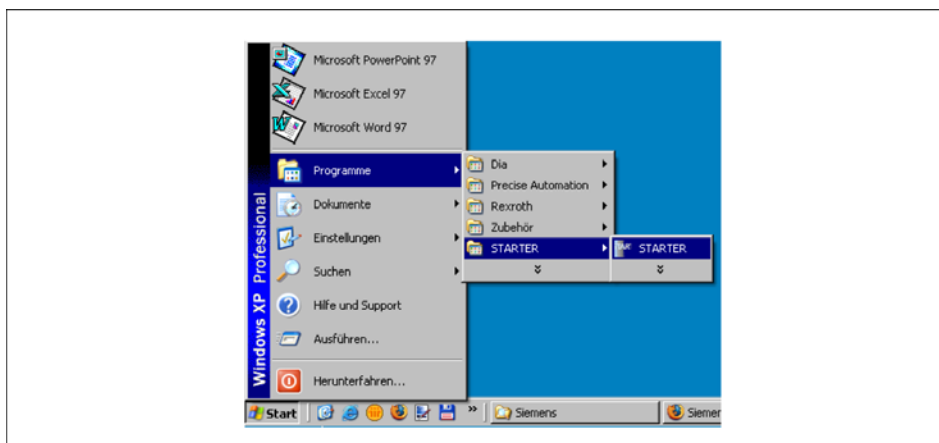
- Ensure that the voltage supply on the encoder interface is set to 5 V.

**Establishing  
the connection**

- ✓ **Read through the user manual of the converter before starting up the converter.**

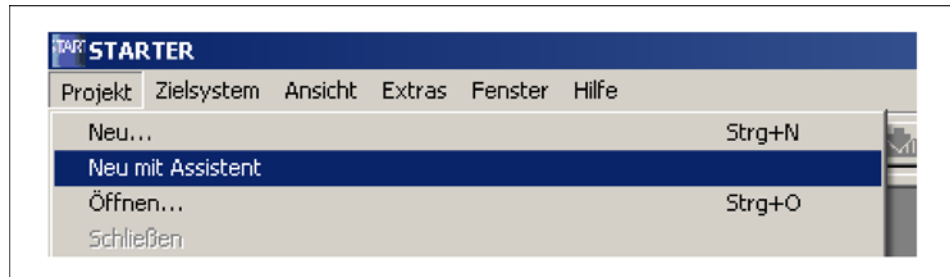


- 1 Connect the motor with the converter:
- 2 Connect the PC to the converter via a Profibus adapter.
- 3 Switch on the converter and power unit.

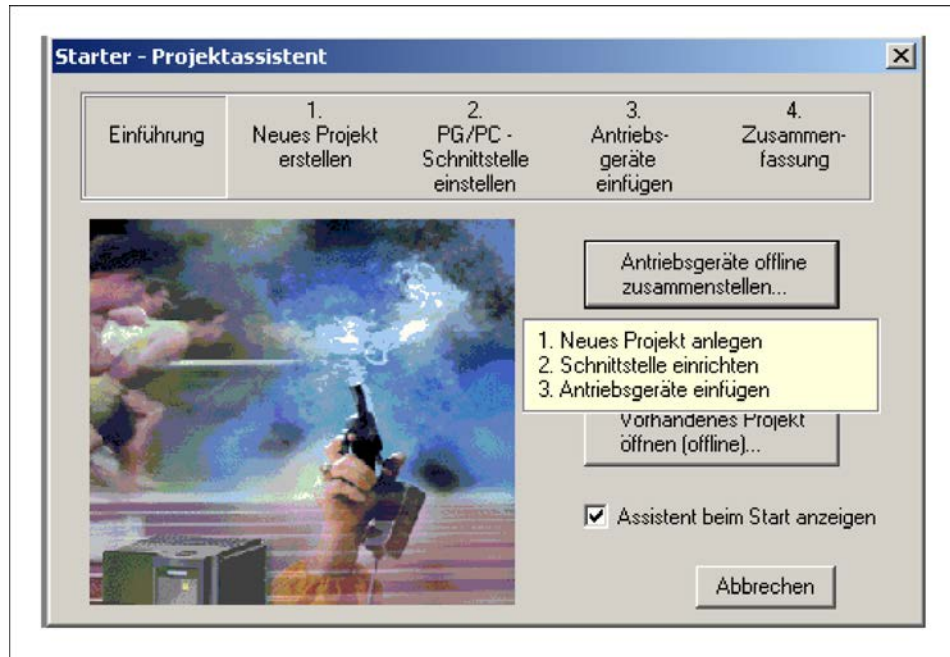


- 4 Initiate the Siemens Starter software.

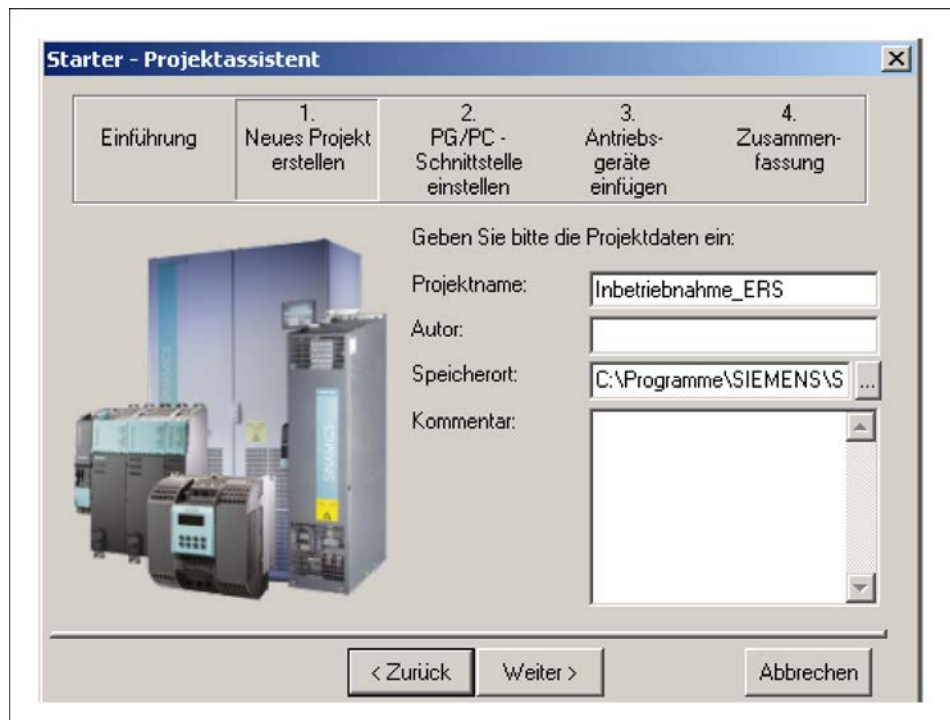
## Creating a new project



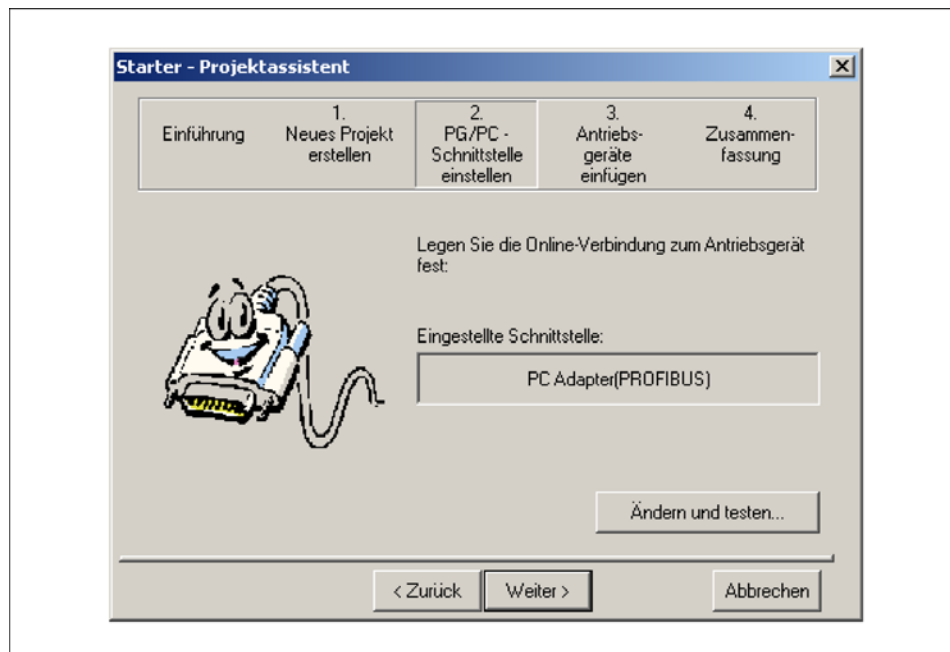
- 1 Start a new project using the wizard.



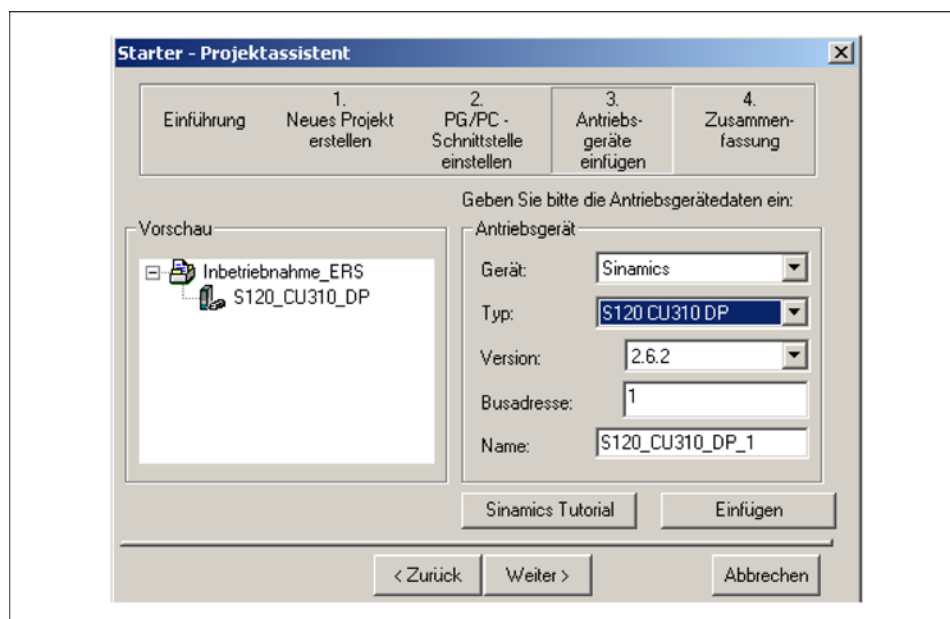
- 2 Assemble the drive control unit offline.



- 3 Assign the project a name, e.g. "Start-up".



⇒ The PG/PC interface has already been set to the Profibus adapter.

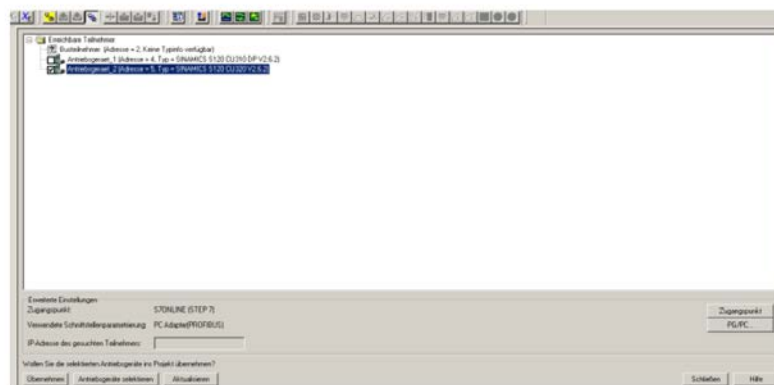
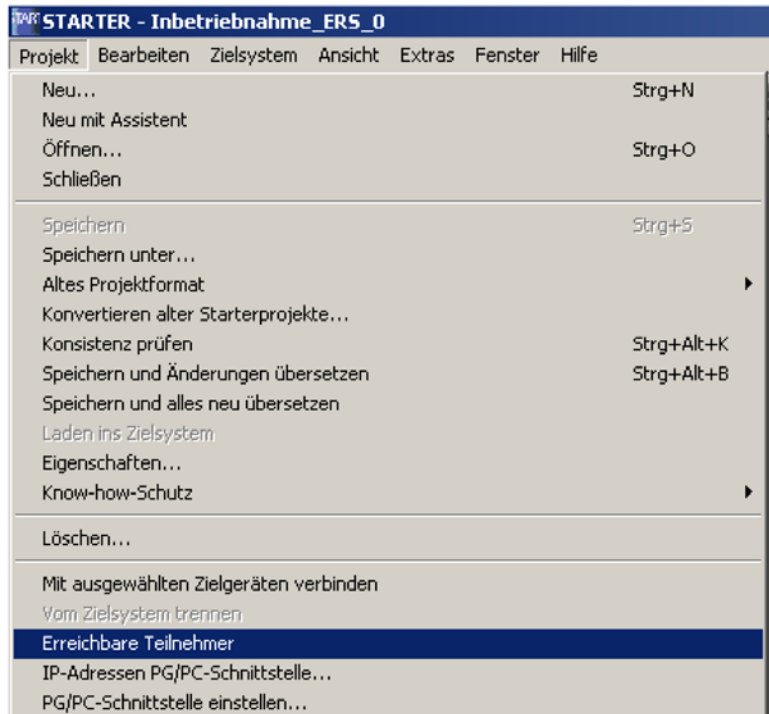


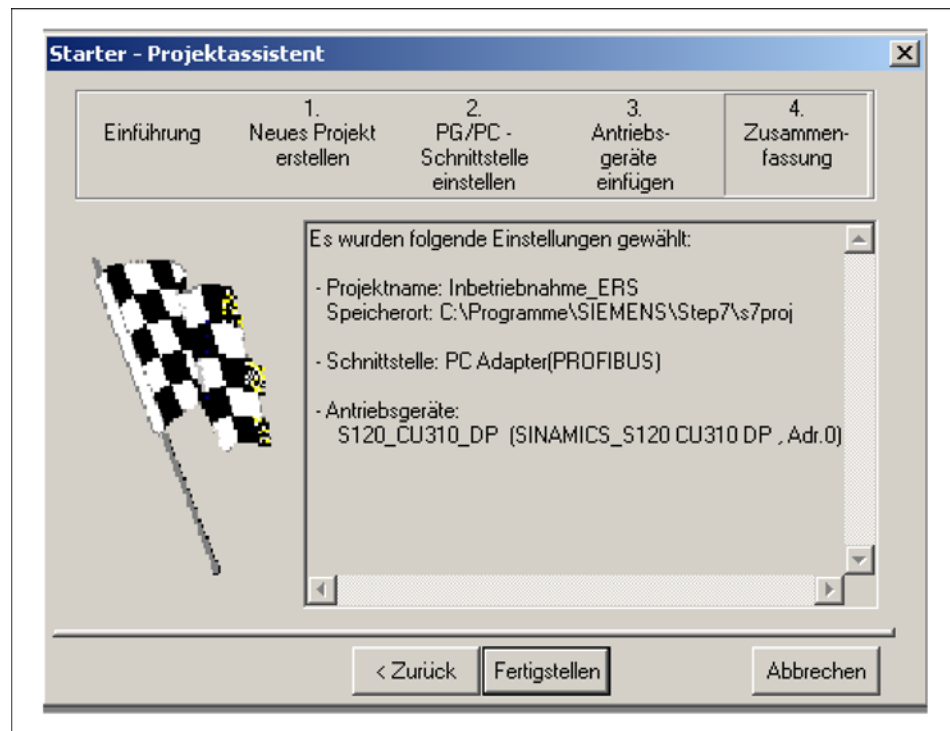
4 Select and integrate the drive unit. The bus address is dependent on the converter.

#### NOTE

The following function can only be performed after an offline project has been created (see step 2).

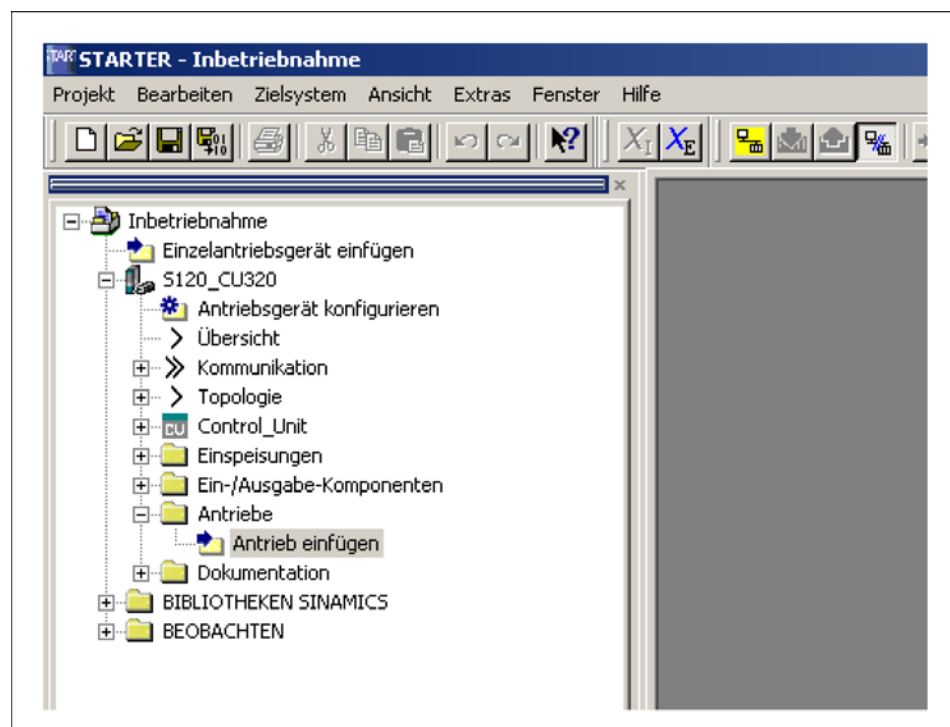
Alternatively, the "Reachable participants" function can be used for adding the drive unit automatically.



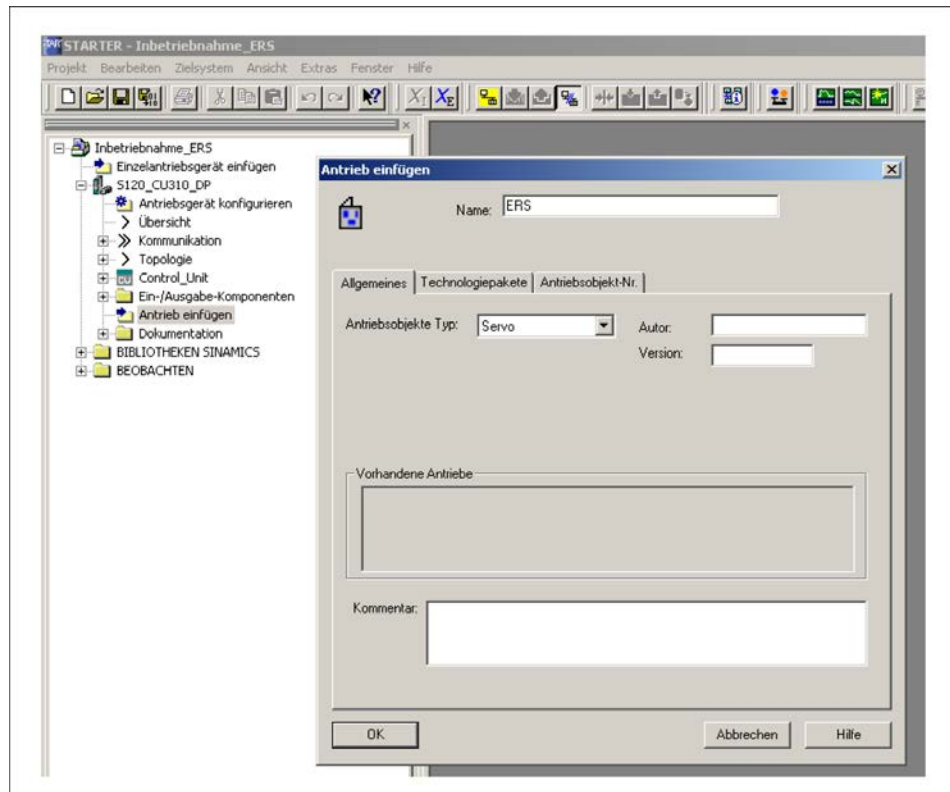


5 Finish project.

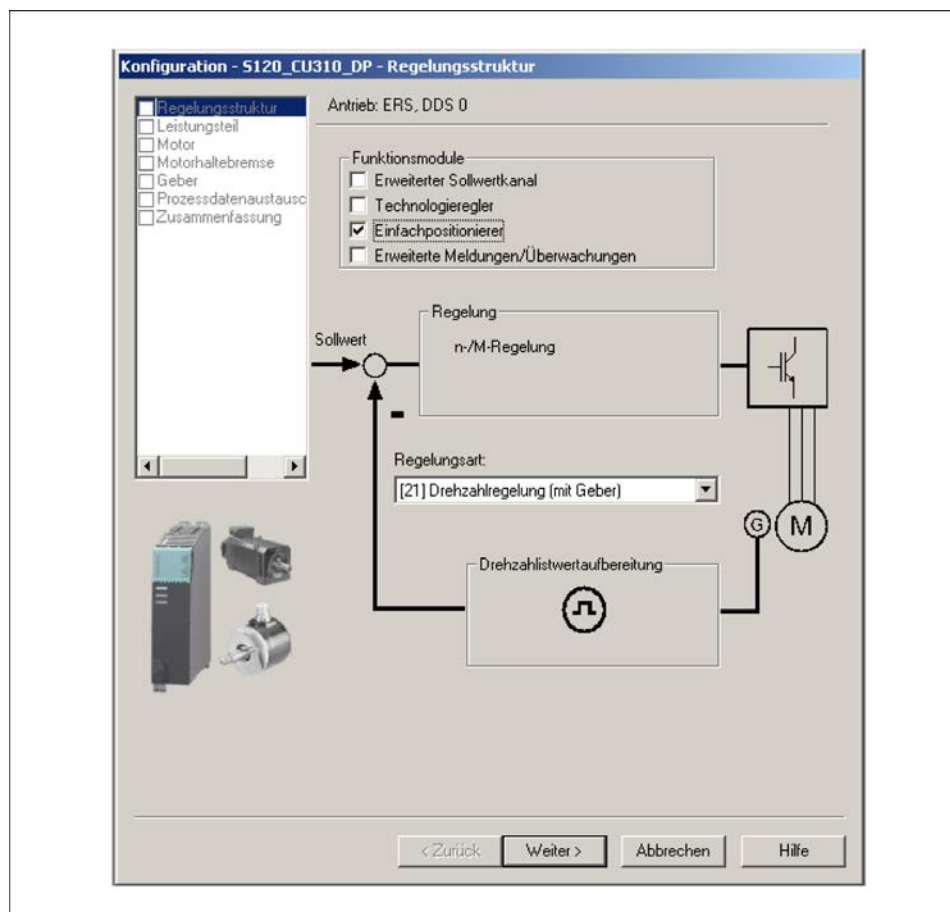
## Parameterizing the drive



1 Integrate the drive unit (double click on "Integrate drive unit").

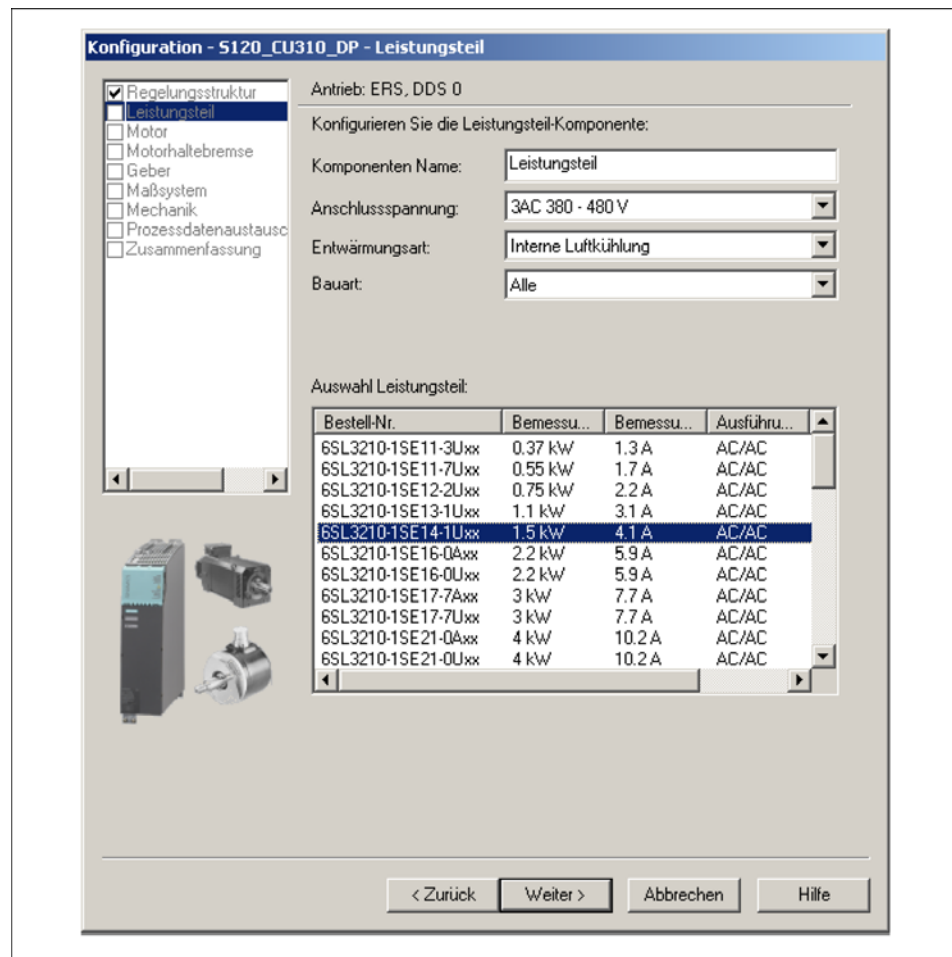


2 Name the drive (e.g. ERS).

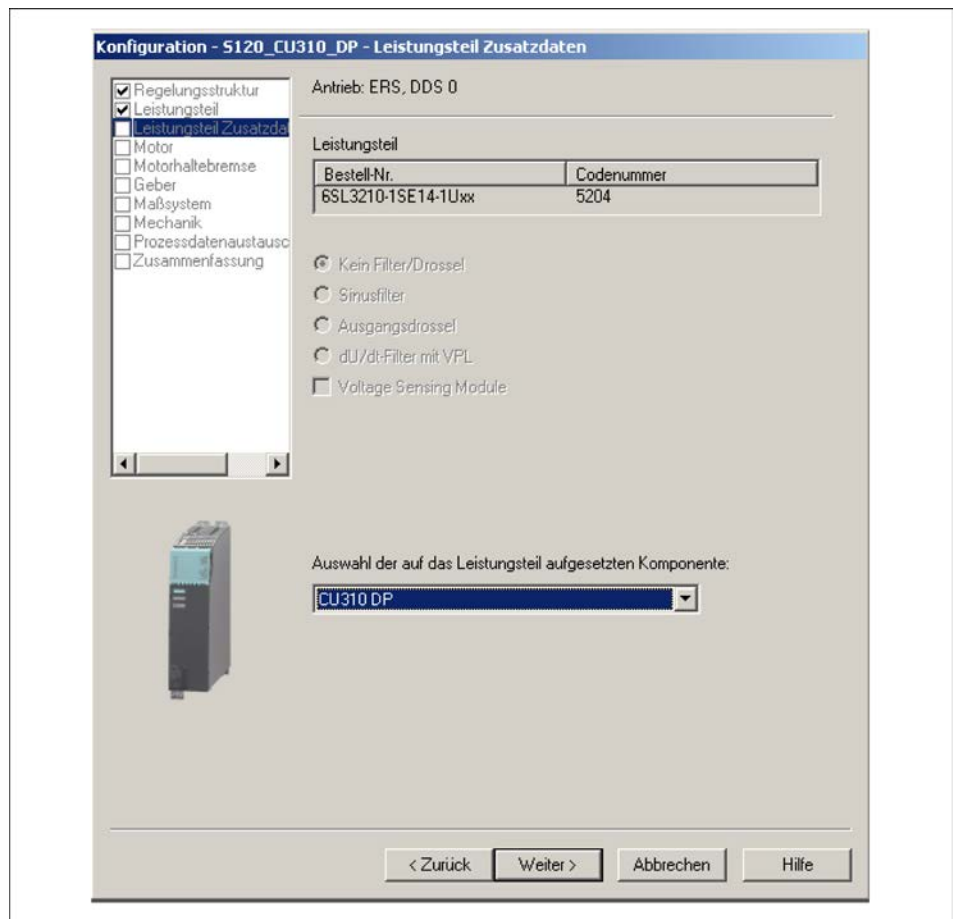


3 Select the control mode (simple positioner and speed control with encoder).

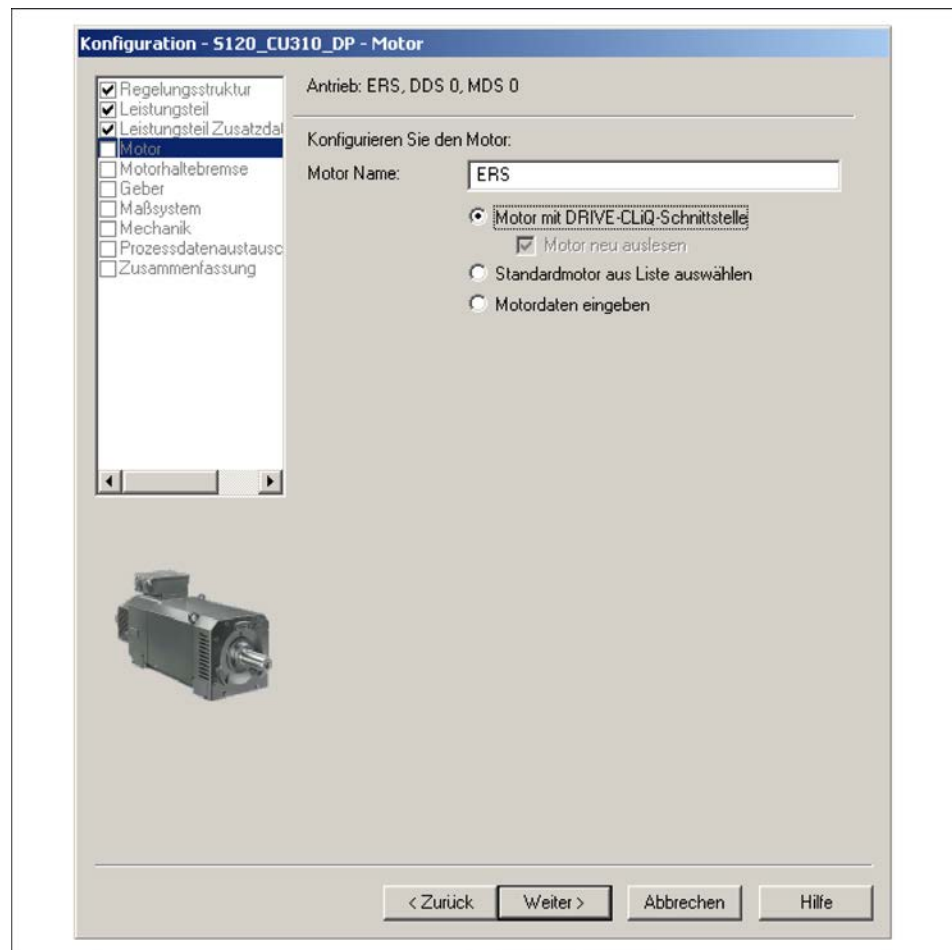




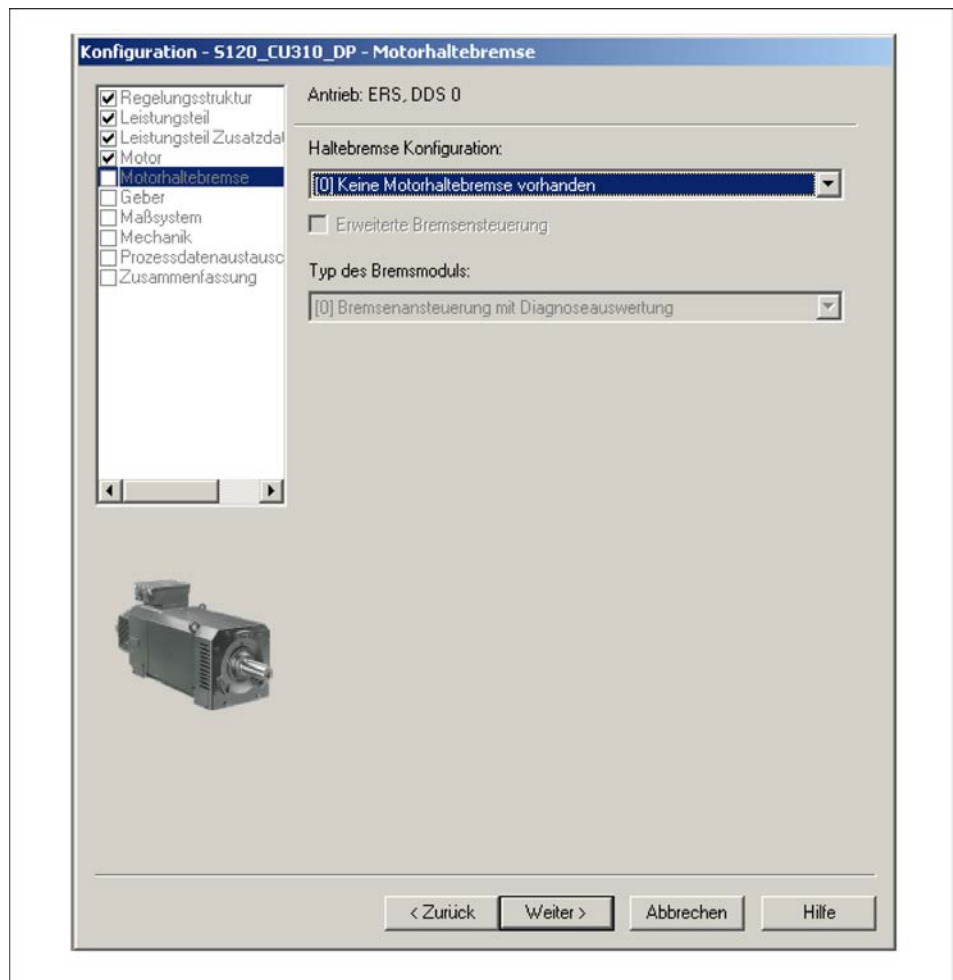
4 Select the power unit.



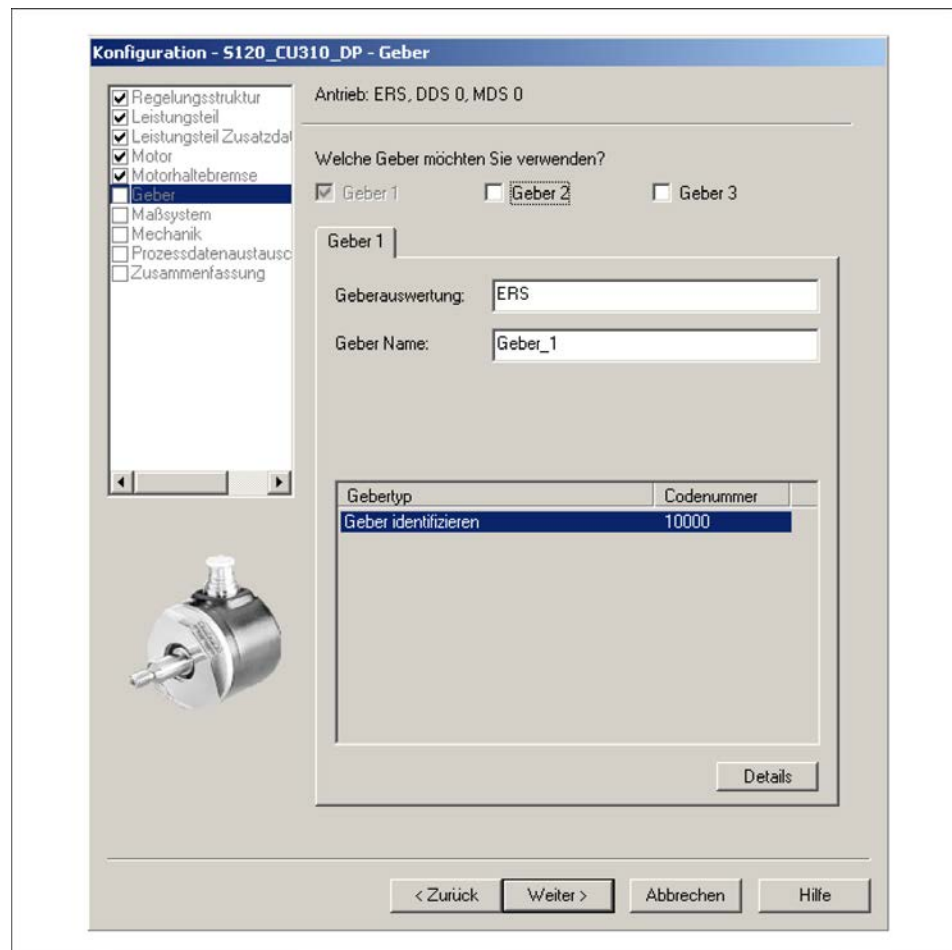
5 Select the control unit.



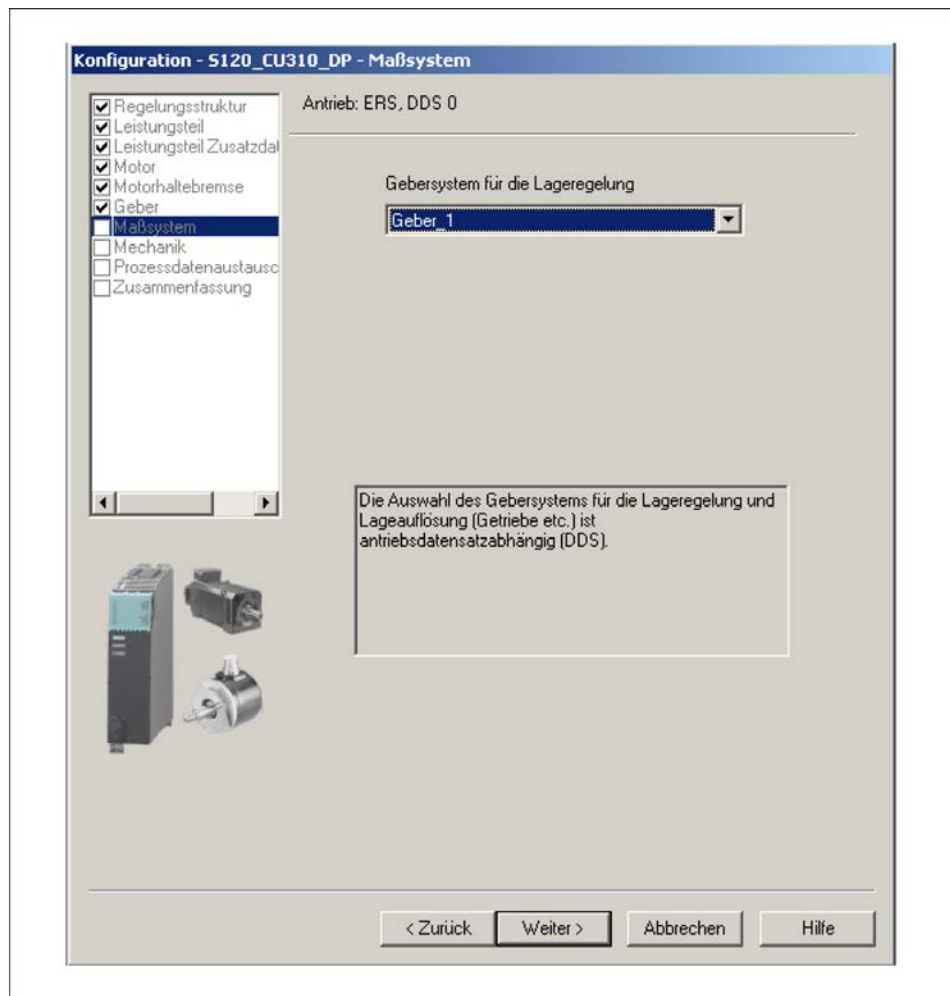
- 6 Enter the motor name, e.g. ERS and select the DRIVE-CLiQ interface.



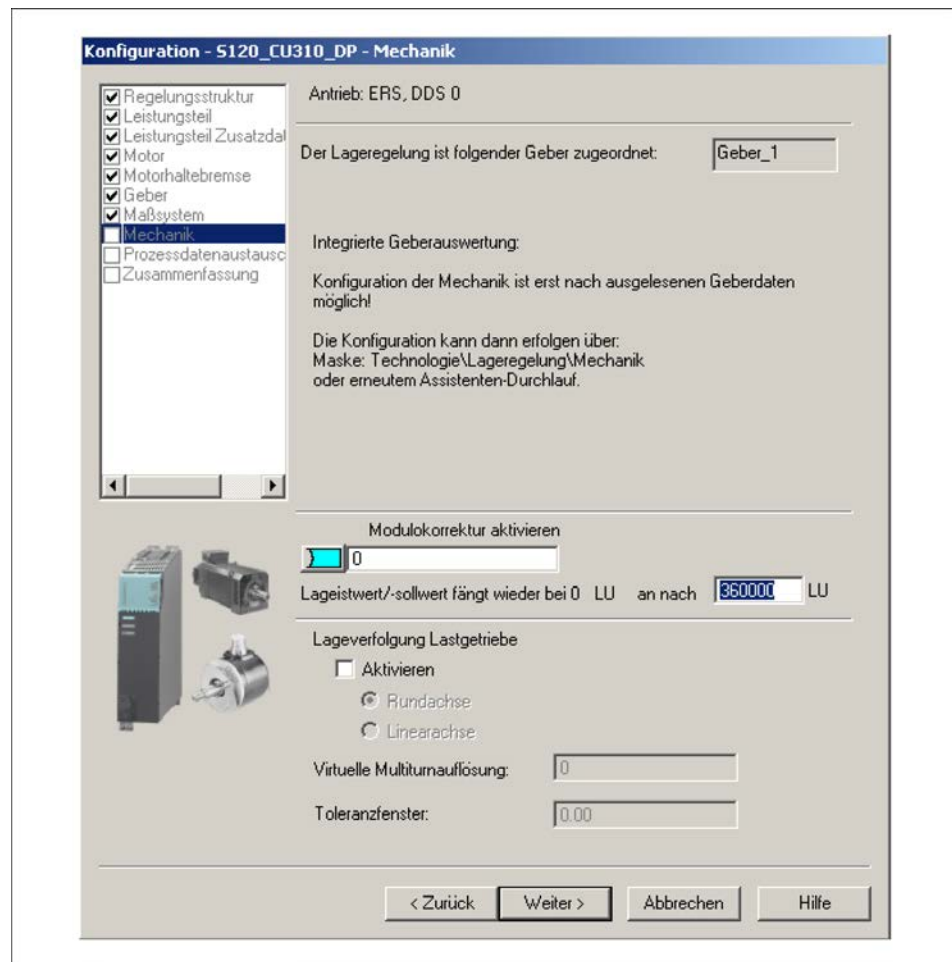
- 7 Configure the brake.  
E.g. Set "No motor holding brake present".



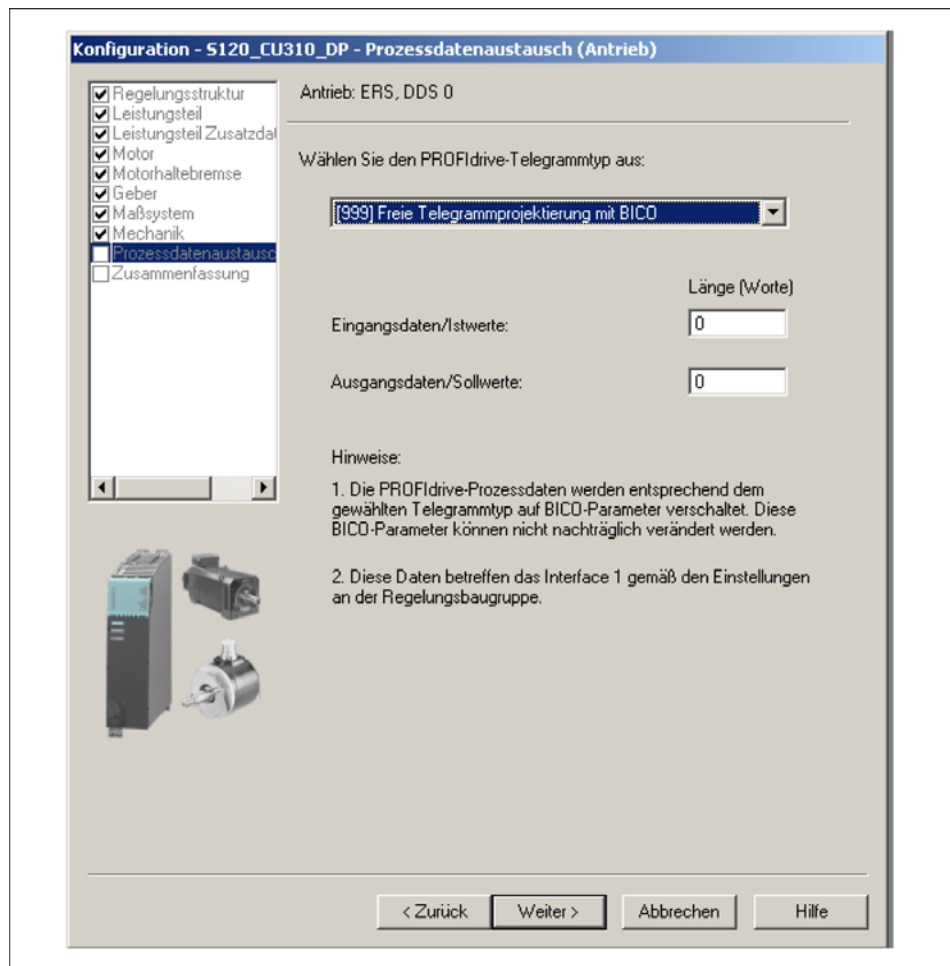
8 Encoder 1 is preset: "Next" without change.



- 9 Configuration of system of dimensions: "Next" without change.

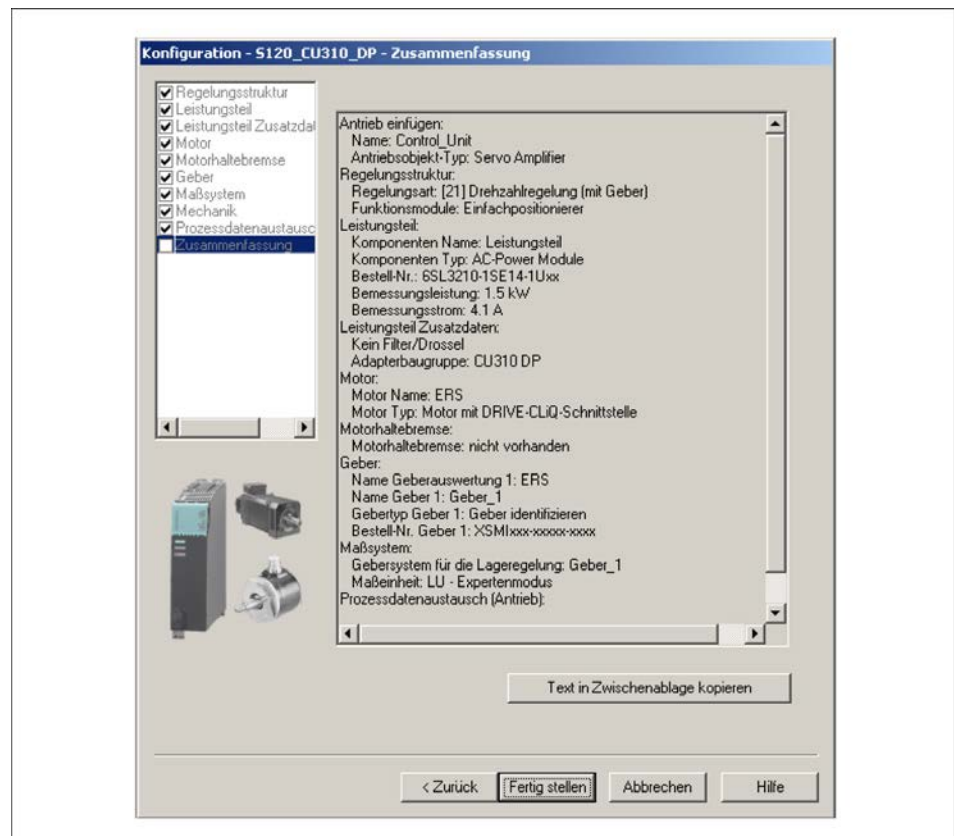


10 Configuring the mechanism: "Next" without change.

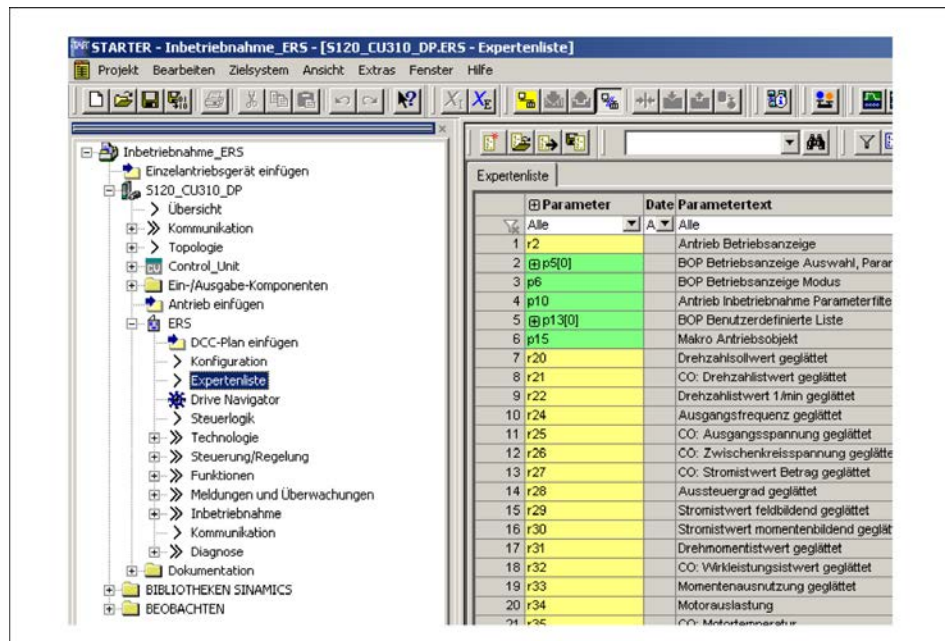


11 Process data exchange (drive): "Next" without change.

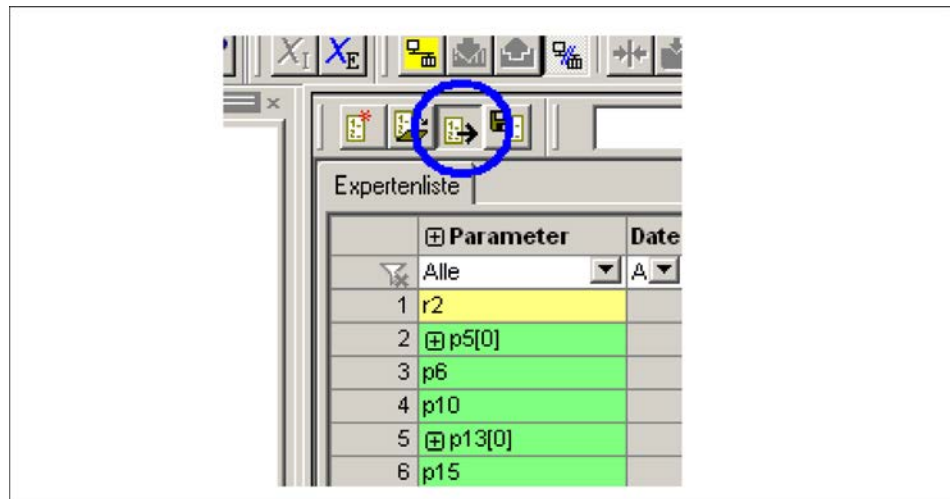




12 Finish.



13 Open the expert list.

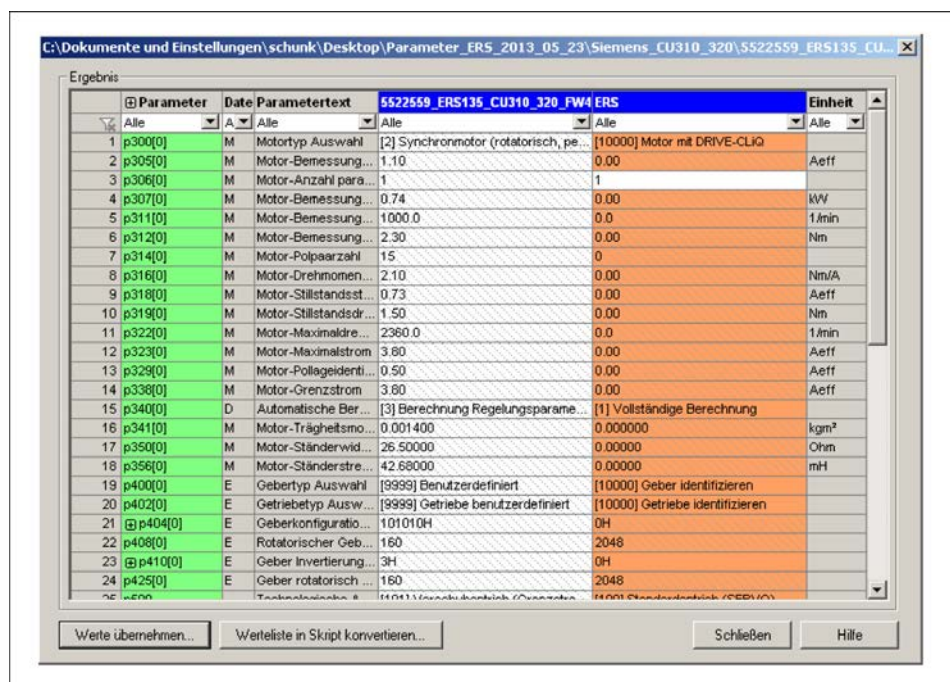


14 Select "Open user-defined value list".

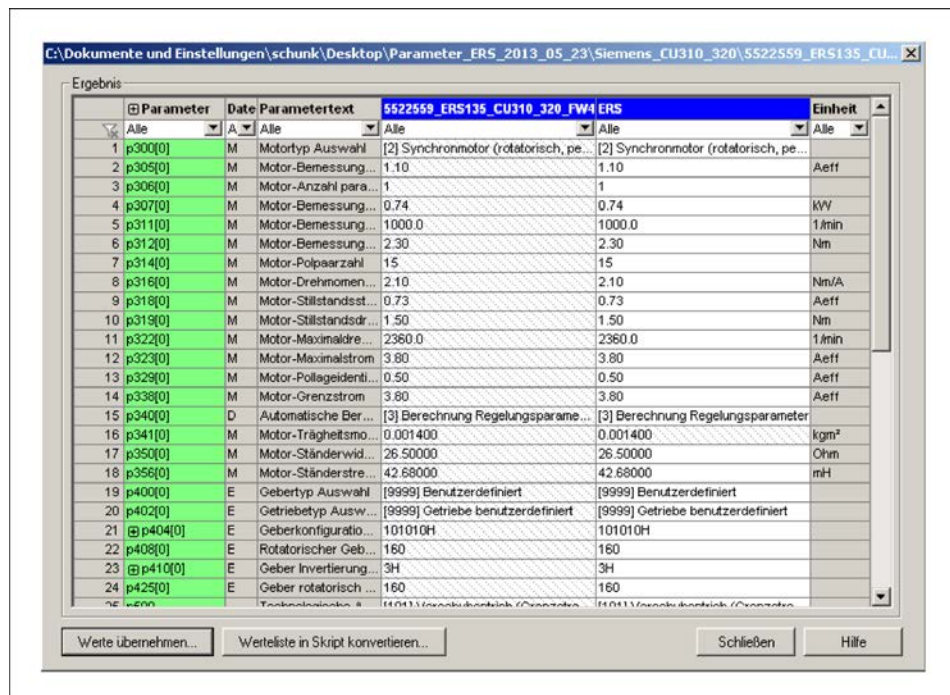


ERS135

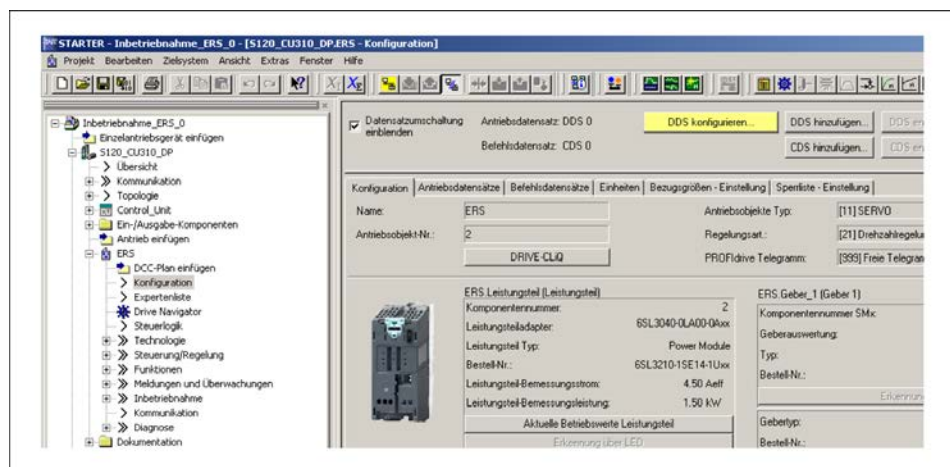
15 Load the parameter file (e.g. ERS135) from the relevant drive.



16 Overview of user-defined value list: "Accept values".

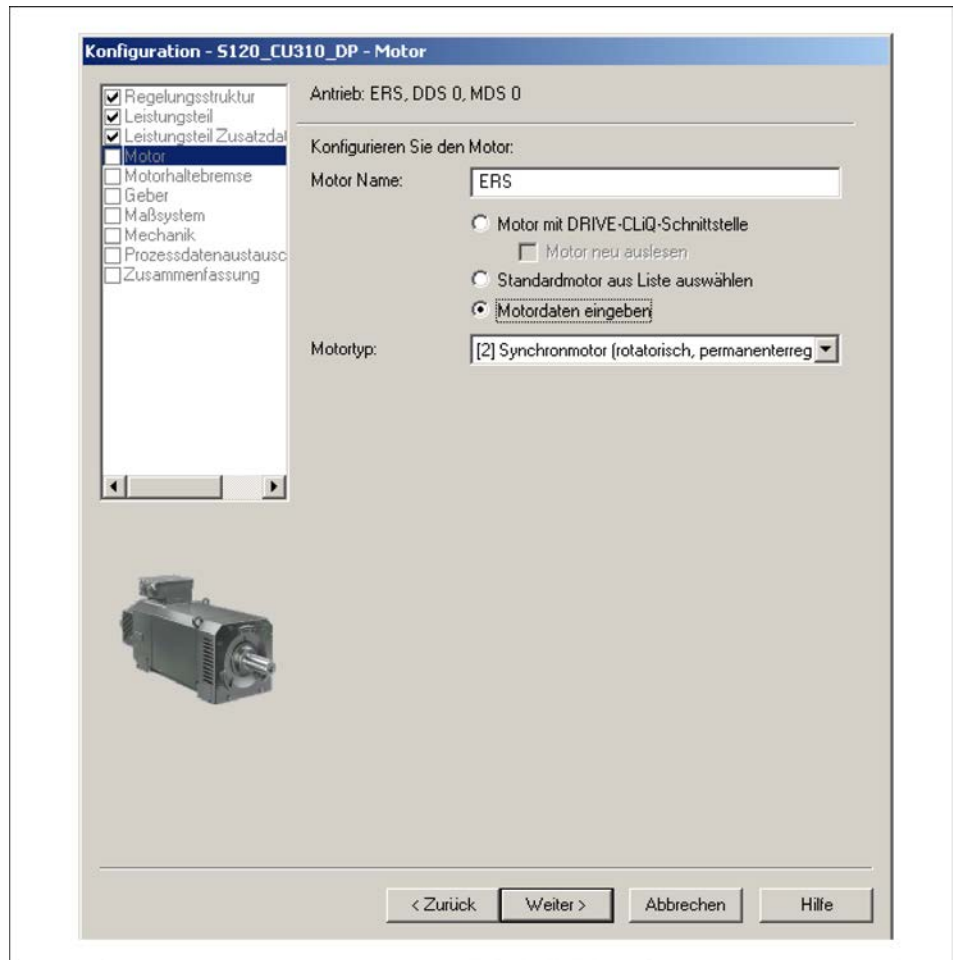


17 Overview of user-defined value list: Continue with "Close".

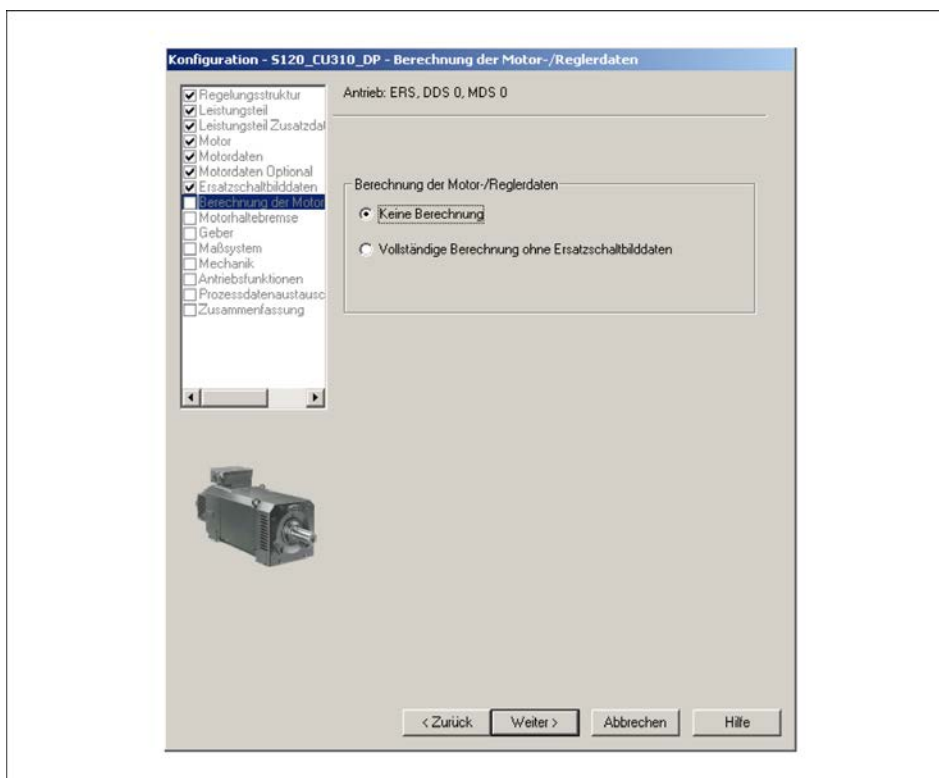


18 Double-click the drive and select "Configure DDS".

19 Accept the settings in steps 3, 4 and 5.



- 20 In the motor configuration step: Now select the "Enter motor data" field.
- 21 Confirm all fields without changes up to "Configuration of controller data".



22 Select "No calculation" for "Calculation of the motor/controller data".



#### NOTICE

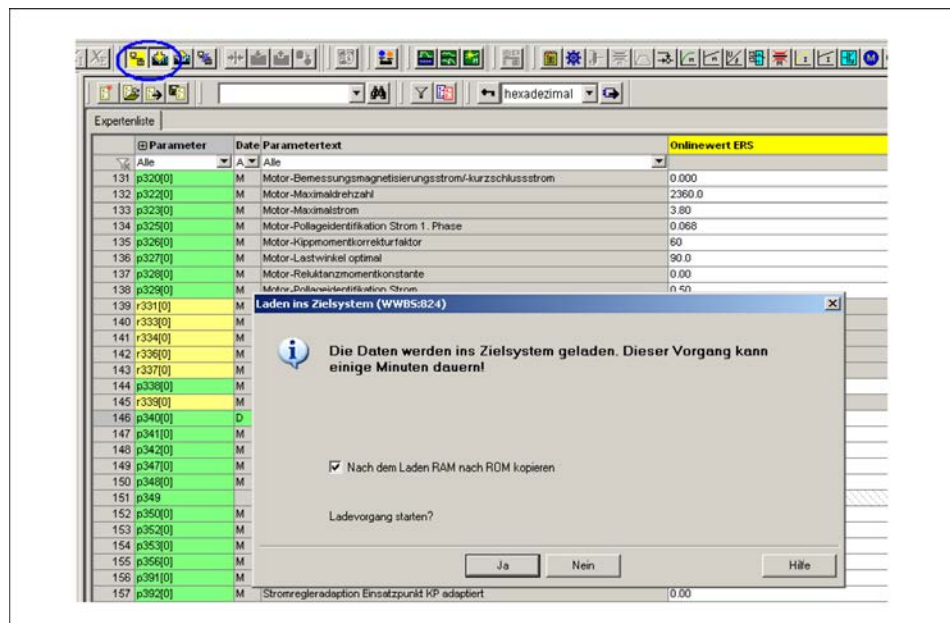
Selecting the "Complete calculation without mimic diagrams" field can cause irreparable damage to the drive!

23 Confirm all windows without changes up to the "Summary" window.



#### NOTICE

Before the drive is switched online and the parameters loaded into the target device, parameter P340 in the expert list must be set to the value [3] – "Calculation of control parameters"!



24 Switch the drive online and load the parameters into the target unit.

#### NOTE

With respect to the use of other functions:

Instruction manual for Siemens Sinamics S120 – series or contact the Siemens support team.



## 15.3 Inbetriebnahme des ERS mit einem beliebigen Umrichter

### NOTE

This chapter is only a quick guide for the simple commissioning of the rotary module ERS with an arbitrary controller. Significant is the user's manual of the controller.

✓ **Before commissioning the controller read carefully the user's manual of the controller.**

- 1 Connect electrical connections (power cable, signal cable) to the controller.
- 2 Check that the rotor can be turned freely.
- 3 Check that all required contact protection measures were taken for moving and live parts.
- 4 Switch on the controller and start the commissioning software.
- 5 Establish communication with the module and configure the controller.
- 6 Check the encoder signal and the signal of the temperature sensor.
- 7 Control the ERS and optimize the parameters.
- 8 Check the bearing noise at regular intervals. ([👉 18.2, Page 113](#)).

### NOTE

If the unit is referenced via the encoder's zero pulse, free motion must be ensured within the range of  $\pm 360^\circ$ .

- Using the ERS in a multiple axis system:  
*Recommendation:* put the axes into operation individually.
- To avoid collisions:  
Prior to the first movement, check the alignment of the ERS, the set direction of counting of the measuring system and the motor's direction of rotation.

## 16 Control parameters

### 16.1 Bosch Rexroth IndraDrive C/CS-Basic setting

- Basic setting**
- 1 Set position controller to:  
 $K_p = 0,5$
  - 2 Set velocity controller to:  
 $K_p = 1; T_n = 0$
  - 3 Set current control to:  
 $K_p = 30; T_n = 3$
  - 4 Set filter for speed control circuit:  
Speed controller smoothing time constant = 0

- Setting the velocity controller**
- 1 In velocity mode, run the motor at a constant velocity of 15 rpm.
  - 2 Increase the  $K_p$  incrementally by 0.5 until the motor begins to vibrate.
  - 3 Reduce the vibrations:  
by increasing the speed controller smoothing time constant.  
If this is not possible:  
Set the speed controller smoothing time constant to 0 and reduce the  $K_p$  until the vibrations cease.
  - 4 Select the value that is half of the exact limit for  $K_p$ .
  - 5 Select a high  $T_n$  value.
  - 6 Reduce the  $T_n$  until the motor begins to vibrate.
  - 7 Select the value that is double the exact limit for  $T_n$ .

- Setting the position controller**
- 1 Increase the  $K_p$  until the desired positioning time is achieved.

**NOTE**

Pay attention that no overshoot occurs.

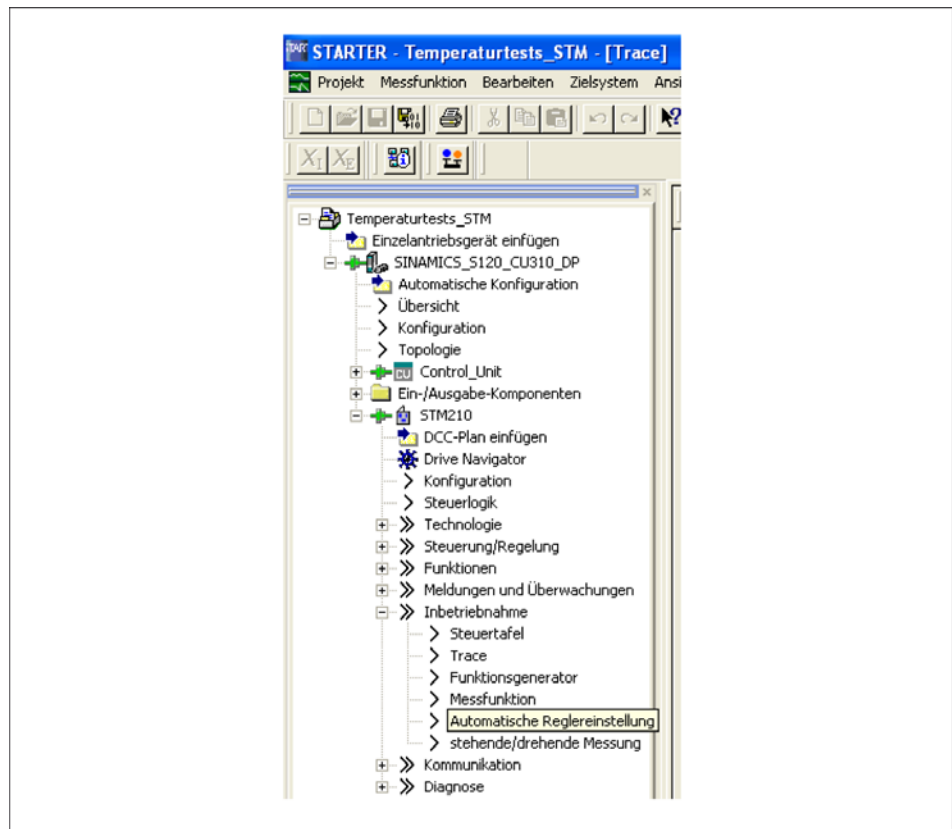
- 2 Increase the  $K_p$  until the current curve is as smooth as desired.  
(Make the current curve visible using the oscilloscope function).

**NOTE**

Be aware of noise emissions or vibrations!



## 16.2 Siemens Sinamics S120 - series



Siemens provides the "Automatic controller settings" function for the purpose of establishing the control parameters.



- 1 Select this function by clicking on the icon shown below:



2 Accept the safety note.

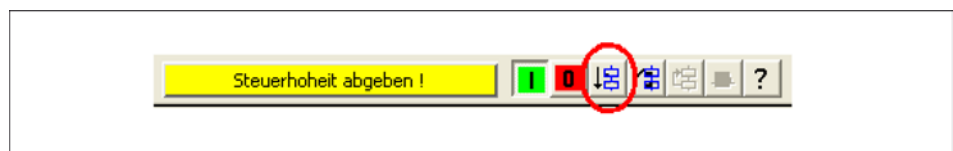


3 Enable the drive:

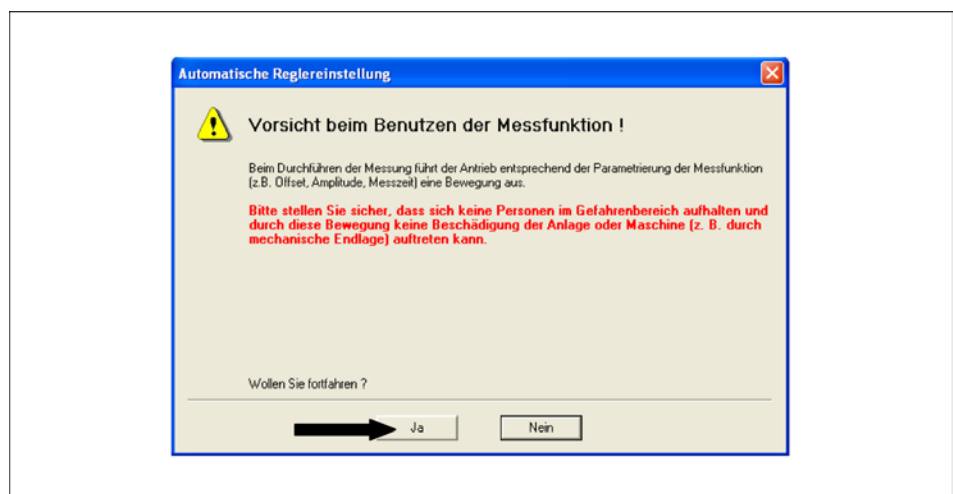
⇒ The individual steps required for determining the parameters can now be carried out.

### Parameter determination

1 Ensure that no-one is positioned in the danger zone and that there is no potential for material damage.

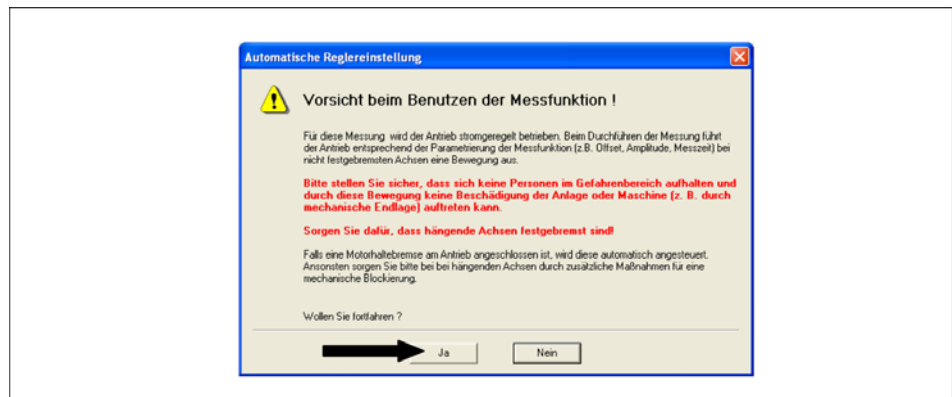


2 Click the button.

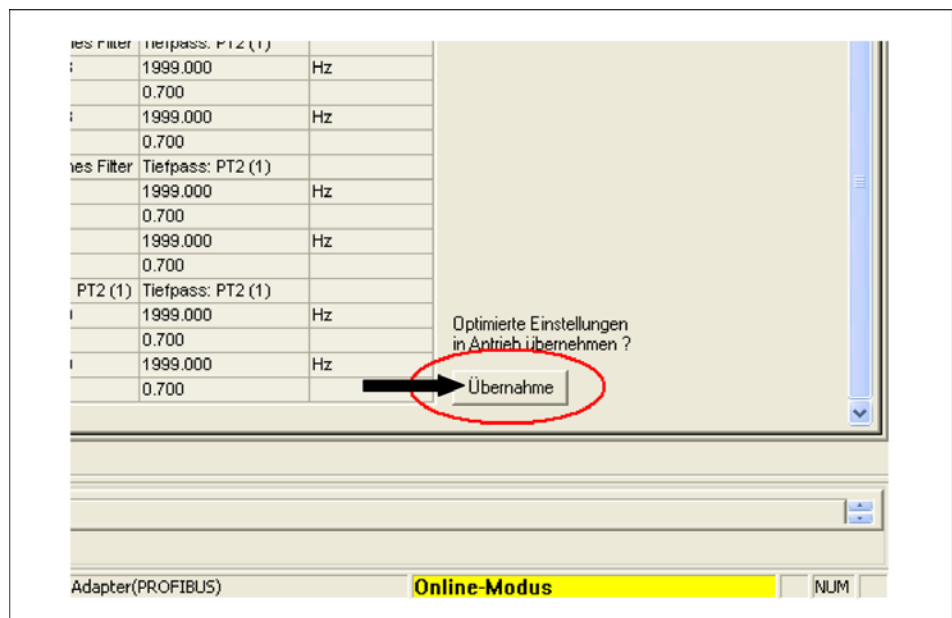


3 Acknowledge the warning:

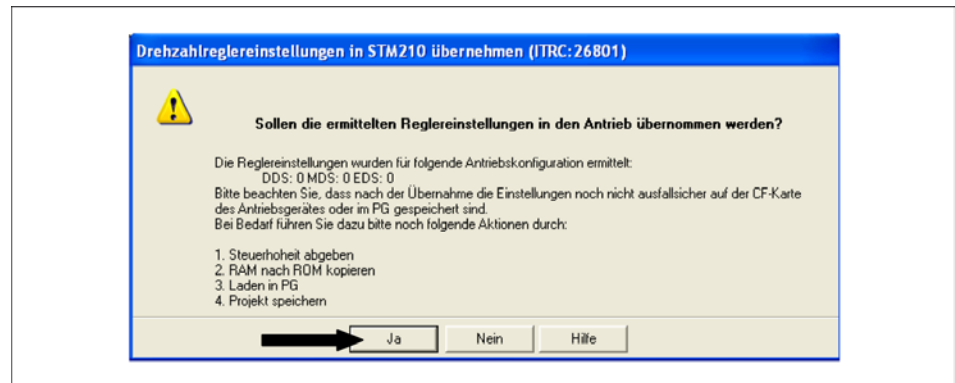
- ⇒ The control parameters are now determined automatically.  
In the first two steps, the mechanism is measured in the upper and lower frequency ranges.



- 4 Acknowledge the warning with "yes".



- 5 Click on "Accept".



- 6 Click button "yes" to acknowledge the acceptance.
- ⇒ the new parameters can be transmitted to the controller.
  - ⇒ The motor can now be operated with the new parameters.

### NOTE

The Siemens auto tuning process selects a fairly hard controller setting, which can result in high noise emissions.

To reduce the noise emission, it is recommended that the gain  $K_p$  of the speed controller to reduce by 30-50%.

## 17 Trouble shooting

### 17.1 ERS dreht sich nicht

Possible cause	Corrective action
Interruption in the supply lines	<ul style="list-style-type: none"> <li>• Check the supply lines for defects.</li> <li>• Check the electrical connections. Electrical connection.</li> </ul>
No motion release	<ul style="list-style-type: none"> <li>• Check the controller settings.</li> </ul>
Controller is defective	<ul style="list-style-type: none"> <li>• <b>DANGER! Risk of fatal injuries due to electric shock!</b> Check whether there is voltage at the controller's output.</li> </ul> <p>If there is no voltage:</p> <ul style="list-style-type: none"> <li>• Check the connection pin assignment Electrical connection, see operating manual for the controller.</li> </ul>
Communication between master and controller is interrupted	<ul style="list-style-type: none"> <li>• Check the communication.</li> </ul>
Rotor is blocked mechanically	<ul style="list-style-type: none"> <li>• Check the mechanical components.</li> <li>• Check the evenness at the mounting surface Mechanical connection.</li> </ul>
Shaft encoder defective	<ul style="list-style-type: none"> <li>• Check shaft encoder and its connection.</li> </ul> <p>If a defect is detected:</p> <ul style="list-style-type: none"> <li>• ERS must be sent to SCHUNK with a repair order.</li> </ul>
Short-circuit between turns in the motor	<ul style="list-style-type: none"> <li>• Check the connection resistance with a multimeter, (<a href="#">🔗 12, Page 44</a>).</li> </ul> <p>If the difference between the individual motor phases exceeds 0.1 Ohm:</p> <ul style="list-style-type: none"> <li>• ERS must be sent to SCHUNK with a repair order.</li> </ul>
Short-circuit to ground due to moisture or short-circuit to ground due to electrical defect	<ul style="list-style-type: none"> <li>• Check the protective conductor.</li> <li>• Check the electrical connection and connectors for ground leakage.</li> </ul> <p>If the ERS has a ground leak while the power cable is disconnected:</p> <ul style="list-style-type: none"> <li>• ERS must be sent to SCHUNK with a repair order.</li> </ul>

Possible cause	Corrective action
Incorrect phase connections	<ul style="list-style-type: none"> <li>• Check the electrical connections Electrical connection.</li> </ul>
Incorrect controller settings	<ul style="list-style-type: none"> <li>• Check the parameters and setting values, see operating manual for the controller.</li> </ul>
Motor phases or encoder signals confused	<ul style="list-style-type: none"> <li>• Check the electrical connections Electrical connection.</li> <li>• Check the encoder signals and the shielding of the encoder cable.</li> </ul>

### 17.2 ERS has regulation difficulties

Possible cause	Corrective action
Controller settings not ideal	<ul style="list-style-type: none"> <li>• Check the controller settings (direction of rotation of motor and encoder direction of counting).</li> </ul>

### 17.3 ERS oscillates

Possible cause	Corrective action
Motor overload	<ul style="list-style-type: none"> <li>• Check the dimensioning.</li> <li>• Reduce the load.</li> <li>• Check the controller settings.</li> </ul>
Controller settings not ideal	<ul style="list-style-type: none"> <li>• Check the controller settings.</li> </ul>

### 17.4 Bearing noise



Possible cause	Corrective action
Incorrect assembly	<ul style="list-style-type: none"> <li>• Check the evenness at the mounting surface, Mechanical connection.</li> </ul>
Bearing defective due to overload	<ul style="list-style-type: none"> <li>• ERS must be sent to SCHUNK with a repair order.</li> </ul>


### 17.5 Error message for the winding temperature

Possible cause	Corrective action
The electrical connection to the temperature sensor is faulty	<ul style="list-style-type: none"> <li>Check resistance between the controller and the temperature sensor in the ERS.</li> </ul> <p>If necessary:</p> <ul style="list-style-type: none"> <li>replace the electrical connection.</li> </ul>
Temperature sensor defective	<ul style="list-style-type: none"> <li>Check the resistance of the temperature sensor.</li> </ul> <p>If the resistance exceeds 630 Ohms at room temperature:</p> <ul style="list-style-type: none"> <li>ERS must be sent to SCHUNK with a repair order.</li> </ul>
Thermal motor overload	<ul style="list-style-type: none"> <li>Reduce the load.</li> <li>Mount the motor on heat-conducting materials to dissipate excess motor heat.</li> </ul>
Rotor is blocked mechanically	<ul style="list-style-type: none"> <li>Check the mechanical components.</li> <li>Check the evenness at the mounting surface, Mechanical connection.</li> </ul>
Encoder signals are faulty; encoder line shielding is not corrected.	<ul style="list-style-type: none"> <li>Check the encoder's power supply.</li> <li>Check the encoder signals and the shielding of the encoder cable.</li> </ul>
The electrical connection to the temperature sensor is faulty	<ul style="list-style-type: none"> <li>Check resistance between the controller and the temperature sensor in the ERS.</li> </ul> <p>If necessary:</p> <ul style="list-style-type: none"> <li>replace the electrical connection.</li> </ul>
Motor overload; overvoltage or undervoltage:	<ul style="list-style-type: none"> <li>Check the dimensioning.</li> <li>Reduce the load.</li> <li>Check the controller settings.</li> <li>Check the output power supply.</li> </ul>

## 18 Maintenance and care

### 18.1 Maintenance and lubrication intervals

	 <b>DANGER</b>
	<p><b>Risk of fatal injuries due to electric shock!</b>          If the electrical connections are released from the live module, arcing may be the result.</p> <ul style="list-style-type: none"> <li>• Switch off the energy supply.</li> <li>• Only have work on the module performed by appropriately trained specialist personnel.</li> </ul>

	<b>NOTICE</b>
	<p><b>At ambient temperature above 60°C the lubricants can harden faster.</b></p> <ul style="list-style-type: none"> <li>• Interval decrease accordingly.</li> </ul>

#### Recommendation

Maintenance and seal replacement should be done by SCHUNK because the rotor must be aligned and assembled with an assembly device.

#### Maintenance intervals

Baugröße	RVK 100 048V
Intervall [Mio. Zyklen] Bearing lubrication [h]	20,000
Visual inspection [h]	2,500

This information refers to use under normal operating and ambient conditions:

- Clean workshop atmosphere
- No splashing water
- Small amounts of abrasive and process dust



## 18.2 Module Servicing

For maintenance work or repairs, send the complete module along with a repair order to SCHUNK.

**Visual inspection** The regular visual inspection of all supply lines is the prerequisite for the perfect operation of the ERS.

- 1 If supply lines are defective, put the machine out of operation immediately.
- 2 Replace damaged connection cables.
- 3 Check the ERS every 2500 operating hours or once a year for bearing noise:

Acoustic bearing inspection	Bearing noise	Further procedure
	Smooth noise (typical bearing noise)	Everything okay, ERS can continue to be operated.
	Uneven grinding noise	The motor is not set up correctly: <ul style="list-style-type: none"> <li>• check the evenness of the mounting surfaces Mechanical connection.</li> </ul>
	Loud and uneven noise / motor not running smoothly	The motor is not set up correctly: <ul style="list-style-type: none"> <li>• check the evenness of the mounting surfaces Mechanical connection.</li> </ul> bearings defective: <ul style="list-style-type: none"> <li>• Send the ERS to SCHUNK along with a repair order.</li> </ul>

**Cleaning** Clean the ERS dry at regular intervals to remove all dirt.

If the housing is soiled, please only rub it dry, e.g. with a cloth. Do not immerse or spray!

When all maintenance work has been completed:

Refit the safety devices provided, such as covers and safety switches.

## 18.3 Modul zerlegen

The module may only be disassembled and repaired by SCHUNK, otherwise injuries to mechanism may occur.

Non-compliance will invalidate the warranty.

## 19 Transport, storage and disposal

### 19.1 Transport

- The packaging must protect the drive from all external effects (such as mechanical shocks and humidity).
- Protect the module from shocks.
- Package the module in such a way that the electrical supply lines do not obstruct transport and are not damaged themselves.
- Comply with climatic category 2K3 in accordance with EN50178.
- Transport temperature -5°C (+23°F) to +60°C (+140°F), with maximum fluctuations of 20 K/hour.
- Transport air humidity: relative humidity of 5%-95%, non-condensing.
- During transport and handling, make sure that none of the components are bent or insulation space is changed.
- The ERS contains components that are sensitive to electrostatic charge. Avoid any electrostatic charging of the ERS.

### 19.2 Packaging

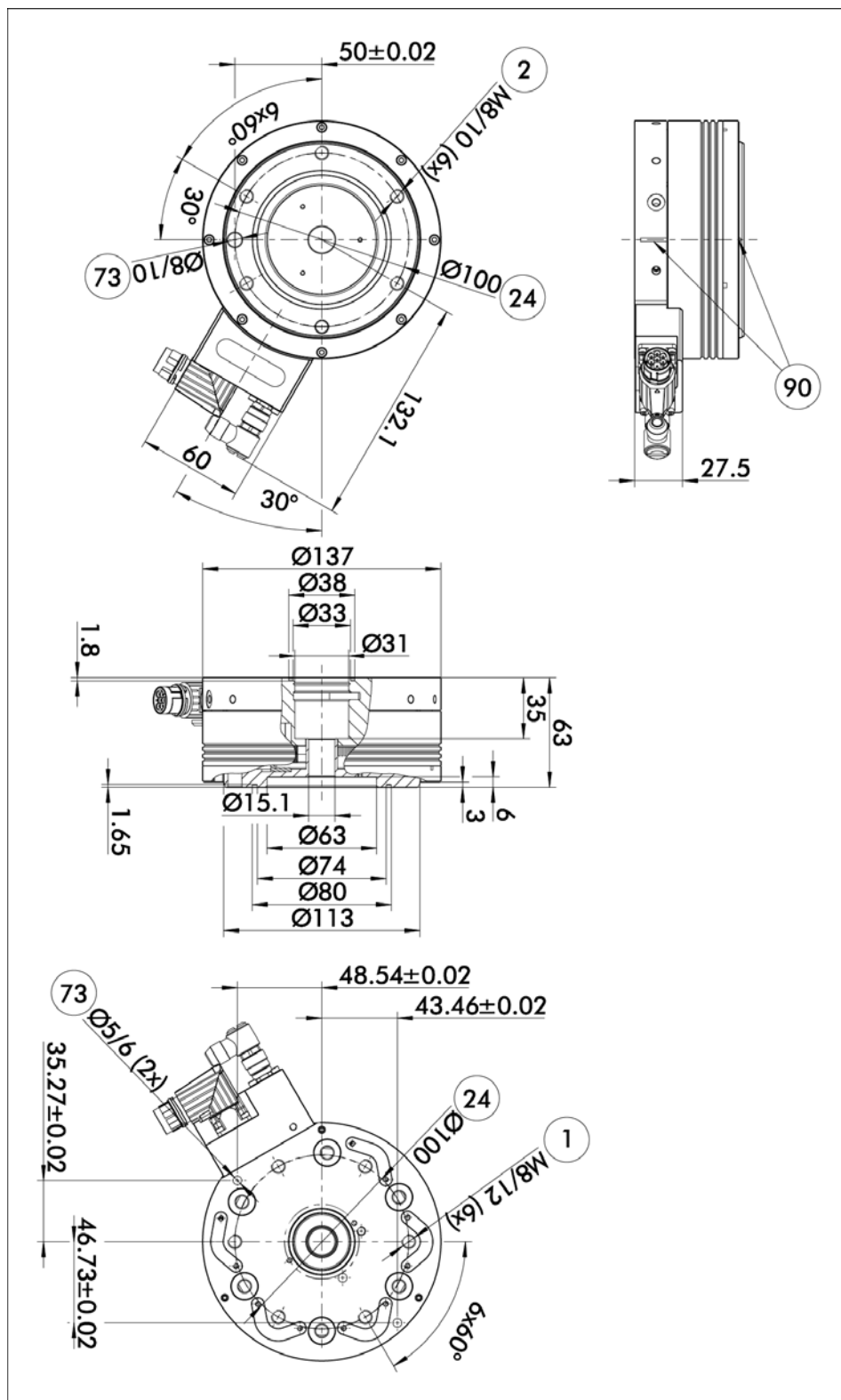
- Cardboard packaging with paper foaming.
- The maximum stacking height is **three modules**.

### 19.3 Storage

- Protect the product against the effects of humidity
- The storage temperature should be between +5°C and +60°C.
- The storage location must be clean, dry and well ventilated.
- No outdoor storage permitted.
- No condensation permitted!
- Comply with climatic category 1K4 in accordance with EN50178.
- Observe the maximum stacking height of three packaged modules.

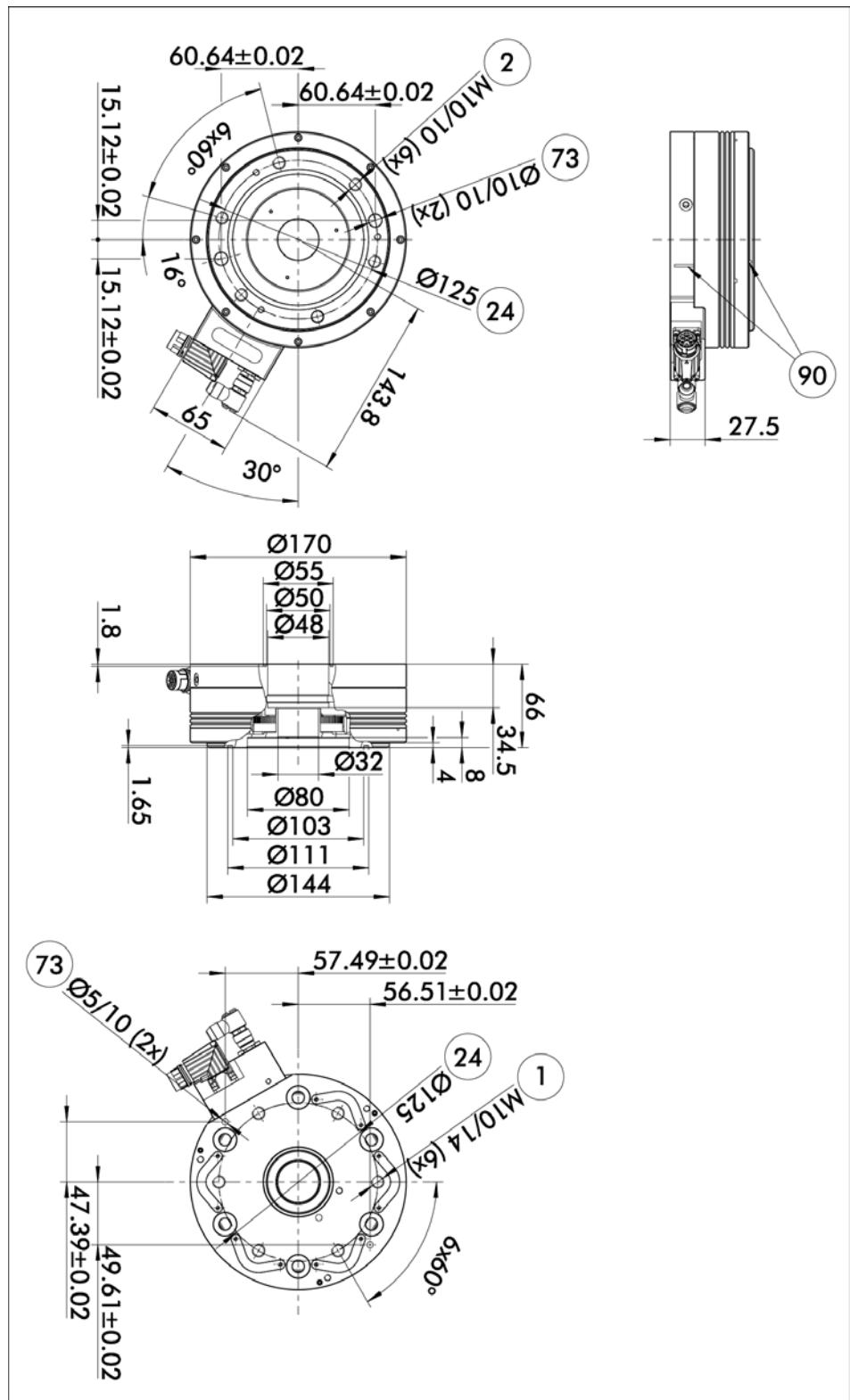
### 19.4 Disposal

- Observe the locally valid legal disposal regulations.
- Environmentally sound disposal via the corresponding recycling or workshop centers.
- SCHUNK GmbH & Co. KG accepts no liability for the consequences of incorrect disposal by the customer.



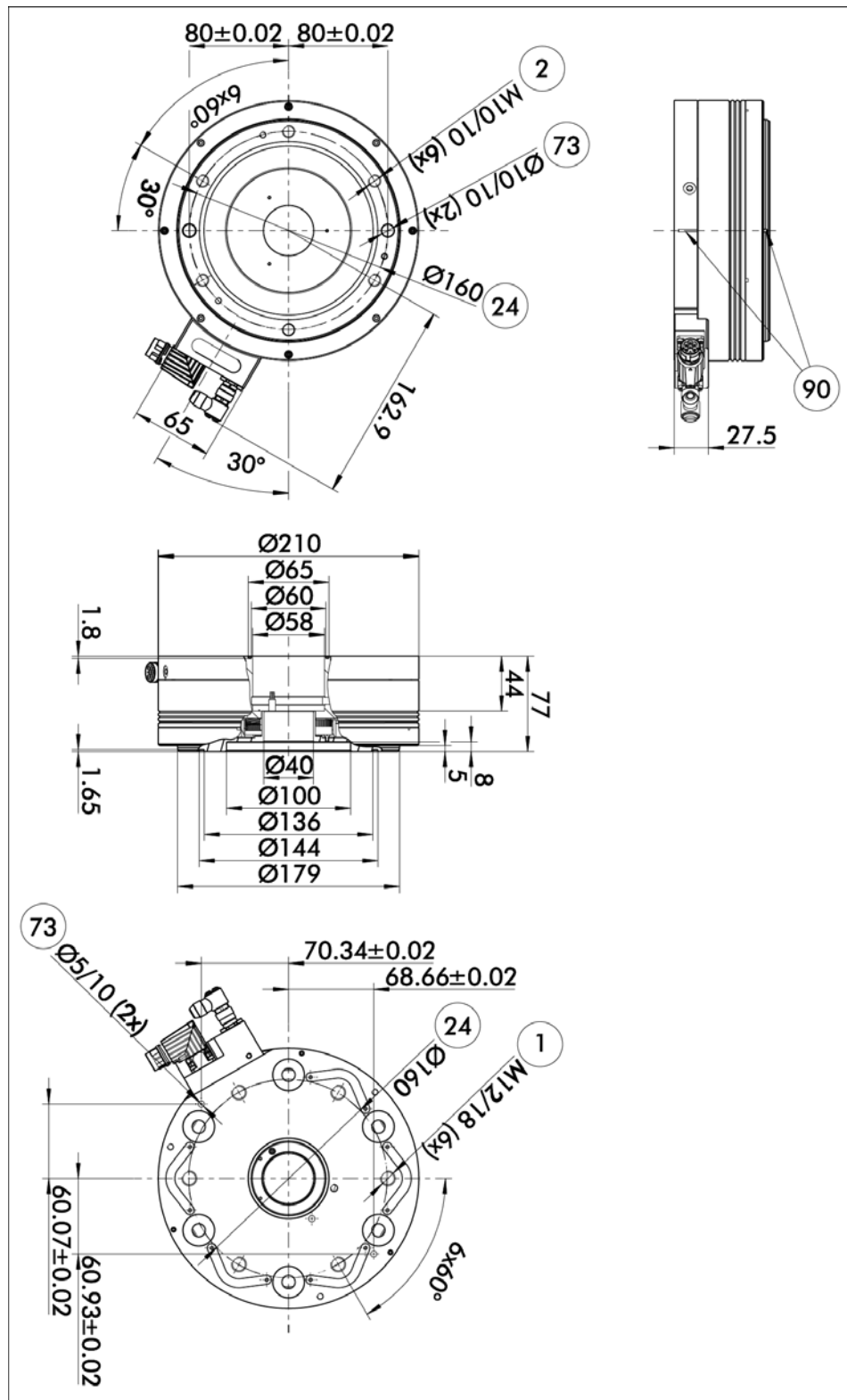
Assembly drawing ERS 135

## 20.2 ERS 170



Assembly drawing ERS 170

## 20.3 ERS 210



Assembly drawing ERS 210

## 21 Translation of original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

Manufacturer/ SCHUNK GmbH & Co. KG Spann- und Greiftechnik  
Distributor Bahnhofstr. 106 – 134  
D-74348 Lauffen/Neckar

We hereby declare that on the date of the declaration the following incomplete machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Produktbezeichnung: Revolving unit with ERS 560V Rotary Module / RVK 100 100 / elektric  
Ident.-Nr. 0315605, 0315606, 0315625, 0315626, 0315615, 0315616, 0315635,  
0315636

The product also complies with **LVD Directive (2006/95/EC)** .

Applied harmonized standards, especially:

EN ISO 12100:2011-03	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1: 2006	Safety of machinery - Electrical equipment of machines, Part 1: General requirements (IEC 60204-1:2005 (modified))
EN 61000-6-2: 2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005)
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards Emission standard for industrial environments (IEC 61000-6-4:2006)
EN ISO 9409-1:2004	Industrial robots - Mechanical interfaces - Part 1: Plates (ISO 9409-1:2004); German version EN ISO 9409-1:2004

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery to state offices.

The special technical documents according to Appendix VII, Part B belonging to the incomplete machine have been compiled.

Person authorized to compile the technical documentation:  
Robert Leuthner, Address: see manufacturer's address

*Signature - see original declaration*

Lauffen/Neckar, April 2015

i.V. Ralf Winkler; Bereichsleitung Entwicklung Greifsysteme

